Mr. John Grantham State of Washington Department of Ecology Nuclear & Mixed Waste Program P. O. Box 47600 Olympia, WA 98504-7600

FLUOR DANIEL, INC.

Date: February 2, 1993

Reference: Hanford Waste Vitrification Plant

DOE Contract DE-AC06-86RL10838

Fluor Contract 8457

Transmittal No.: WDOE-316

Dear Mr. Grantham:

TRANSMITTAL

We enclose * copy of the items listed below. These are issued per US-DOE request. *3 FULLSIZE BLUELINES ROLLED & 2 SPECIFICATIONS, & 1 REDUCED

Response due to Fluor: N/A Responds to: P33B PACKAGE								
	NUMBER	REV	DATE	TITLE				
SEE TRANSMITTAL ATTACHMENT				P33B PACKAGE PROCESS SUPPORT VESSELS AND EQUIPMENT VITRIFICATION BUILDING				
			! ! !					
				REFERENCE DOCUMENTS LIST RECONCILIATION LIST				

Distribution:

Reference: FRP-727, FUP-346

R. L. Long: DOE-RL, w/0

TWP/AME Corresp Cntrl Cntr, MSIN A5-10

(P33B PACKAGE), w/O
P. Felise, WHC-RL (MSIN G6-16), w/1F, 1 SPEC

Environmental Data Management Center

(MSIN H6-08), w/1F, 1 spec D. Duncan, US EPA, Region X, w/0

Very truly yours,

R. S. Poulter Project Director



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DISCIPLINE	PACKAGE	DRAWING NUMBER	SHEET NUMBER	DWG REV	SIGNATURE DATE	DRAWING TITLE
30	P338	W-2-116011	1	0		PROCESS SUPPORT VESSELS AND EQUIPMENT VIT BLDG TITLE SHEET
30	P338	H-2-116012	÷	۵		PROCESS SUPPORT VESSELS AND EQUIPMENT VIT BLDG DWG INDEX
40	P338	H-2-120151	•	Ó		TK-540-014 NITRIC ACID DECON FEED TANK
40	P338	H-2-120151	2	a		TK-540-014 NITRIC ACID DECON FEED TANK DETAILS
40	P338	H-2-120152	1	0		TK-540-017 OXALIC ACID DECON FEED TANK
40	P338	H-2-120156	1	0		TK-210-001 CRANE DECON FEED TANK (ACID)
40	P338	H-2-120156	2	0		TK-210-001 CRANE DECON FEED TANK (ACID) DETAILS
40	P338	N-2-120157	1	٥		TK-210-002 CRANE DECON FEED TANK (CAUSTIC)
40	P33B	H-2-120157	2	۵		TK-210-002 CRANE DECON FEED TANK (CAUSTIC) DETAILS
40	P33B	N-2-120161	1	0		TK-450-001 PROCESS COOLING WATER EXPANSION TANK
40	P338	H-2-120162	1	0		TK-460-001 MELTER COOLING WATER EXPANSION TANK
40	P338	H-2-120163	1	0		TK-480-001 PROCESS WATER TANK
40	P338	H-2-120164	1	0		TK-520-001 FLOOR DRAIN CATCH TANK
40	P338	N-2-120164	2	0		TK-520-001 FLOOR DRAIN CATCH TANK DETAILS
40	P338	N-2-120165	1	0		TK-520-002 REGULATED DRAINS CATCH TANK
40	P338	H-2-120165	2	0 -		TK-520-002 REGULATED DRAINS CATCH TANK DETAILS
40	P338	H-2-120166	1	0		TK-520-003 ACID DRAIN CATCH TANK
60	P338	N-2-120166	2	0		TK-520-003 ACID DRAIN CATCH TANK DETAILS
40	P33B	H-2-120167	1	0		TK-520-004 ORGANIC ACID DRAIN CATCH TANK
40	P338	N-2-120167	2	0		TK-520-004 ORGANIC ACID DRAIN CATCH TANK DETAILS
60	P338	H-2-120168	1	0		TK-520-005 FLOOR DRAIN SAMPLING TANK
10	P33B	H-2-120168	2	0		TK-520-005 FLOOR DRAIN SAMPLING TANK DETAILS
10	P338	H-2-120169	1	0		TK-540-002 SUGAR SOLUTION FEED TANK
0	P338	H-2-120170	1	0		TK-540-004 OFFGAS TREATMENT CHEMICAL FEED TANK
10	P338	H-2-120171	1	0		TK-540-006 KOH/FRIT MODIFIER FEED TANK
0	P338	H-2-120172	1	0		TK-540-008 FORMIC ACID FEED TANK
60	P33B	N-2-120173	1	0		TK-540-012 50% NITRIC ACID FEED TANK
0	P33B	H-2-120174	1	Q		TK-540-019 POTASSIUM PERMANGANATE FEED TANK
0	P338	N-2-120175	1	0		TK-540-021 SODIUM NITRITE FEED TANK
0	P338	H-2-120176	1	0		TK-540-023 50% CAUSTIC FEED TANK
0	P338	N-2-120177	1	0		TK-540-024 FLUSH WATER FEED TANK

00/PIPING & INSTRUMENT DIAGRAMS, 05/CIVIL, 10/HVAC, 20/STRUCTURAL, 30/ARCHITECTURAL, 40/MECHANICAL, 50/PIPING, 51/FIRE PROTECTION, 60/ELECTRICAL, 70/CONTROL SYSTEMS, 90/MISCELLAMEOUS

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DISCIPLINE	PACKAGE	DRAWI NG NUMBER	SHEET NUMBER	DWG REV	SIGNATURE DATE	DRAWING Title	
40	P338	N-2-120178	1	0		TK-540-027 DIATOMACEOUS EARTH SLURRY FEED TANK	
40	P338	N-2-120179	1	0		TK-540-029 ZEOLITE SLURRY FEED TANK	
40	P33B	H-2-120180	1	0		TK-540-031 DILUTE SODIUM HYDROXIDE FEED TANK	
40	P338	H-2-120181	1	0		TK-580-002 PROCESS FRIT SLURRY FEED TANK (PFSFT)	
40	P338	H-2-120181	2	0		TK-580-002 PROCESS FRIT SLURRY FEED TANK (PFSFT) DETAILS	
40	P338	H-2-120182	1	0		TK-580-003 DECOM FRIT SLURRY FEED TANK (DFSFT)	
40	P338	N-2-120182	2	0		TK-580-003 DECON FRIT SLURRY FEED TANK (DFSFT) DETAILS	
40	P338	H-2-120442	1	0		TK-540-034 ANTIFOAM FEED TANK	
70	2338	н-2-121653	1	0		LP-580-003 & 004 INSTRUMENT PANEL LAYOUT	

TOTAL: 40

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ADD MICKEL ALLOYS ADD	DISCIPLINE	PACKAG	SPECIFICATION NUMBER	PKG REV	PACKAGE TITLE	SIGNATURE DATE	SECTION NUMBER	SECTION REV	SECTION TITLE
		P338	8-595-P-P338	0	EQUIPMENT VITRIFICATION				
P338	40	P33B					01730	0	OPERATION AND MAINTENANCE DATA
	40	P33B							
	40	P338						=	
40	40	P338			<u>-</u>			-	PRECAUTIONS FOR FABRICATION, HANDLING AND STORAGE OF STAINLESS STEED
40 P338 14584W 0 COLD FEED AGITATOR 40 P338 15139 0 AIR DRIVEN DIAPHRAGN PUMPS 40 P338 15145 0 CENTRIFUGAL PUMPS 40 P338 15145 0 SUMP PUMPS 40 P338 15148 0 SEALLESS PUMPS 40 P338 15196 0 IDENTIFICATION AND TAGGING METHODS FOR MECHANICAL EQUIPMENT 40 P338 15648 0 PLATE MEAT EXCHANGERS 40 P338 15649 0 METERING PUMPS 40 P338 15820 0 VACUM BLOWERS 40 P338 15820 0 VACUM BLOWERS 40 P338 15896 0 CENTRIFUGAL BLOWERS 40 P338 15896 0 RUBRATING FILTERS (MECHANICAL) 40 P338 15896 0 RUBRATING FILTERS (MECHANICAL) 40 P338 16610 0 ELECTRICAL REQUIREMENTS FOR PACKAGED MECHANICAL EQUIPMENT	40	P33B					14583	0	
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70 P338 13433 O PRESSURE VESSES - STAINLESS STEEL	70 90	P338					17893 13433	-	INSTRUMENTS FURNISHED WITH MECHANICAL EQUIPMENT FRIT SLURRY FILTERS PRESSURE VESSELS - STAINLESS STEEL

00/PIPING & INSTRUMENT DIAGRAMS, 05/CIVIL, 10/HVAC, 20/STRUCTURAL, 30/ARCHITECTURAL, 40/MECHANICAL, 50/PIPING, 51/FIRE PROTECTION, 57/PIPING STRESS, 58/PIPING NATERIAL, 60/ELECTRICAL, 70/CONTROL SYSTEMS, 90/MISCELLANEOUS

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DISCIPLINE PACKAGE SPECIFICATION	PKG	PACKAGE TITLE	SIGNATURE	SECTION	SECTION	SECTION TITLE
******						0001301 18166
NUMBER	REV		DATE	NUMBER	REV	

TOTAL: 26

P33B - PROCESS SUPPORT VESSEL AND EQUIPMENT

LIST OF REFERENCE DWGS

P33B <u>Document</u>	REF DWG NUMBER	REV No.	REF DWG TITLE
SPEC SECTION 17893	H-2-123070 SH 4 SH 6	-	P&ID - SYS 58 PROCESS FRIT SLURRY PUMP AND FILTER
17892	H-2-123070 SH 4 SH 6	=	P&ID - SYS 58 PROCESS FRIT SLURRY PUMP AND FILTER

U. S. DEPARTMENT OF ENERGY Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-ACO6-86RL10838 FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

ATTACHMENT 1

RECONCILIATION LIST PROCUREMENT PACKAGE P33B VIT BLDG. OUT-OF-CELL TANKS AND ASSOCIATED EQUIPMENT January 27, 1993

- HWVP-0905 "Vit Bldg. and Non-Vit Bldg. Sampling Requirements" must be approved prior to P33B AFC issue February 2, 1993.
 NOTE: HWVP-0905 was approved on February 1, 1993.
- 2. Tank nozzle orientations are subject to change after final piping layouts are completed and plastic model review comments have been incorporated.



PROCESS SUPPORT VESSELS
AND EQUIPMENT VITRIFICATION
BUILDING
B-595-P-P33B

HANFORD WASTE VITRIFICATION PLANT

U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE



DOE CONTRACT NO. DE-AC06-86RL10838

U.S. DEPARTMENT OF ENERGY Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

PROCESS SUPPORT VESSELS AND EQUIPMENT VITRIFICATION BUILDING SPECIFICATION B-595-P-P33B

APPROVED FOR CONSTRUCTIOHN

REVIS	ION	0				
ISSUE	DATE	2-	2-	93		

APPROVED BY:		
REHaney		Jan 127/93
R. El Hapey	Project Package Engineer	Date 17, 1993
DE. Moss	Area Project Manager	Date //27/93
P. J/Speidel meh	Engineering Project Manager	Date 1/21/93
M. S. Akawa for AKY	Systems Manager	Date 1/27/93
A. K. Yee O B. E. Ruttlan for Jak	Independent Safety Manager	Date 127 95
MADILLIAM NO	Quality Assurance Manager	Date 1-27-93
R. S. Poulter ()	Project Director	Date

FEB 2 1993

U.S. DEPARTMENT OF ENERGY

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

Rev. 0

PROCESS SUPPORT VESSELS AND EQUIPMENT VITRIFICATION BUILDING SPECIFICATION B-595-P-P33B

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Section	Title		
05063 05066	Welding Pressure Vessels Welding Specialty Equipment		0 0
DIVISION	13 - SPECIAL CONSTRUCTION		
Section	Title		
13252	Precautions for Fabrication, Handling and Storage of Stainless Steel and Nickel Alloys		0
13433	Pressure Vessels - Stainless Steel		0
DIVISION 1	14 - CONVEYING SYSTEMS		
Section	Title		
14583 14584W	Cold Feed Agitators Cold Feed Agitator		0 0
DIVISION 1	15 - MECHANICAL		
Section	Title		
15139 15141 15145 15148 15196 15648 15649 15820 15821	Air Driven Diaphragm Pumps Centrifugal Pumps Sump Pumps Sealless Pumps Identification and Tagging Methods for Mechanical Equipment Plate Heat Exchangers Metering Pumps Vacuum Blowers Centrifugal Blowers	1	000000000000000000000000000000000000000
15894 15896 15898	Vibrating Filters Roughing Filters/HEPA Filters (Mechanical) HEGA Filters	1	0 0 0

U.S. DEPARTMENT OF ENERGY Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

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DIVISION	17 - INSTRUMENTATION	
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	Frit Slurry Filters	0

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 01730 **OPERATION AND MAINTENANCE DATA** B-595-P-P33B-01730

APPROVED FOR CONSTRUCTION

REVISION	0
ISSUE DATE	2-2-93

WAPA	YES		NO	X_
QUALITY	LEVEL I	_	ΙI	<u>X</u>
SAFETY C	LASS 1	2	3 <u>X</u>	4

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CHECKER:

cotion Writer

APPROVED BY:

Lead Discipline Engineer

U.S. DEPARTMENT OF ENERGY

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

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SECTION 01730 OPERATION AND MAINTENANCE DATA B-595-P-P33B-01730

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SECTION 01730 OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit operation and maintenance (0&M) data which is specifically applicable to this contract and a complete and concise depiction of the provided equipment or product. Data containing extraneous information to be sorted through to find applicable instructions will not be accepted. Present information in sufficient detail to clearly explain user 0&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.1.1 Package Content

For each product, system, or piece of equipment requiring submission of O&M data, submit the package required in the individual technical section. Package content shall be as required in the Paragraph 1.3, "Schedule of Operations and Maintenance Data Packages."

1.2 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.2.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation:

1.2.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.2.1.2 Operator Prestart

Include requirements to set up and prepare each system for use.

1.2.1.3 Start-Up, Shutdown, and Post-Shutdown Procedures

Include a control sequence for each of these operations.

1.2.1.4 Normal Operations

Include control diagrams with data to explain operation and control of systems and specific equipment.

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1.2.1.5 Emergency Operations

Include emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.

1.2.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustments, and inspection.

1.2.1.7 Environmental Conditions

Include a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which equipment should not be allowed to run.

1.2.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair.

1.2.2.1 Lubrication Data

Include lubrication data, other than instructions for lubrication in accordance with Paragraph 1.2.1.6, Operator Service Requirements.

1.2.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair. Provide manufacturer's projection of preventive maintenance man-hours on a daily, weekly, monthly, and annual basis.

1.2.3 Corrective Maintenance

Include manufacturer's recommendations on procedures and instructions for correcting problems and making repairs.

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Rev. 0

1.2.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.2.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation numbering.

1.2.3.3 Maintenance and Repair Procedures

Include instructions and list tools required to restore product or equipment to proper condition or operating standards.

1.2.3.4 Removal and Replacement Instructions

Include step-by-step procedures and list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.2.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays.

1.2.3.6 Corrective Maintenance Man-Hours

Include manufacturer's projection of corrective maintenance manhours. Corrective maintenance that requires participation of the equipment manufacturer shall be identified and tabulated separately.

1.2.4 Appendices

Provide information specified in the preceding paragraphs pertinent to the maintenance or operation of the product or equipment. Include the following:

1.2.4.1 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies.

- A. Manufacturer's Standard Commercial Practice: The parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as a master parts catalog, in accordance with the manufacturer's standard commercial practice.
- B. Other Than Manufacturer's Standard Commercial Practice (MSCP): End item manufacturer may add a cross-reference to implement components' assemblies and parts requirements when implementation in manual form varies significantly from the style, format, and method of manufacturer's standard commercial practice. Use the format in the following example:

End Item Actual Actual Manufacturer's Manufacturer's Name Manufacturer Alphanumeric Sequence and MSCP Part No.

100001

John Doe & Co. 00000

2000002

1.2.4.2 Warranty Information

List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents to keep warranties in force.

1.2.4.3 Personnel Training Requirements

Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.

1.2.4.4 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.3 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

1.3.1 Data Package

- A. Operating instructions
- B. Safety precautions
- C. Operation prestart
- D. Start-up, shutdown, and post shutdown
- E. Normal operations
- F. Emergency operations
- G. Operator Service Requirements
- H. Environmental conditions
- I. Preventative maintenance
- J. Lubrication data
- K. Preventive maintenance plan and schedule
- L. Corrective maintenance
- M. Troubleshooting guides and diagnostic techniques
- N. Wiring diagrams and control diagrams
- 0. Maintenance and repair procedures and manhour requirements
- P. Removal and replacement instructions
- Q. Spare parts and supply list
- R. Parts identification
- S. Warranty information
- T. Personnel training requirements
- U. Testing equipment and special tool information

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PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END OF SECTION

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#13202.054

SECTION 05063
WELDING PRESSURE VESSELS
B-595-P-P33B-05063

APPROVED FOR CONSTRUCTION

REVISION NO. 0
ISSUE DATE Q-Q-93

WAPA YES ___ NO \underline{X} QUALITY LEVEL I ___ II \underline{X} SAFETY CLASS 1__ 2__ 3 \underline{X} 4__

ORIGINATOR:

CHECKER:

A. Estrada, Welding Engineer Date

D. A. Buzzelli,

<u>6-93</u>

APPROVED BY:

R.B. Erickson

C. J. Divona

Lead Discipline Engineer

1-26-93

Date

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

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ATTACHMENTS

<u>ATTACHMENT</u>	TITLE
Α	WELD MAP
В	WELDING PROCEDURE SUMMARY

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SECTION 05063 **WELDING PRESSURE VESSELS**

PART 1 GENERAL

1.1 SUMMARY

This specification section defines the welding, examination and testing requirements for shop fabrication of out-of-cell pressure vessels.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) Boiler and Pressure Vessel Code

ASME	Section	II,

1989 Material Specifications -

Part C

Welding Rods, Electrodes, and Filler

Metals

ASME Section V

1989 Nondestructive Examination

ASME Section VIII,

1989 Rules for Construction of

Division 1

Pressure Vessels

ASME Section IX

1989 Welding and Brazing Qualification

AMERICAN SOCIETY OF NONDESTRUCTIVE TESTING (ASNT)

ASNT SNT-TC-1A

1988 Recommended Practice - Personnel

Qualification and Certification in

Nondestructive Testing

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4	1986 Standard Symbols for Welding, Brazing and Nondestructive Testing
AWS A3.0	1989 Welding Terms and Definitions
AWS D10.11	1987 Recommended Practices for Root Pass Welding of Pipe Without Backing
AWS QC1	1988 Standard for AWS Certification

of Welding Inspectors

1.3 RELATED REQUIREMENTS

Specification Section 13252 Precautions for the Fabrication, Handling and Storage of Stainless Steel and Nickel Alloys

1.4 DEFINITIONS

CMTR - Certified Material Test Report

NDE - Nondestructive Examination

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

- 1.6.1 Welding Procedure Specifications (ASME Form QW-482 or equivalent) and Procedure Qualification Records (ASME Form QW-483 or equivalent) shall be submitted for Buyer approval. This requirement shall also pertain to purchased items contracted by Seller. They shall be in accordance both with the requirements of ASME Section IX and this specification section. Seller shall review their contractor's procedures prior to submittal to verify their conformance to the requirements of this specification section.
- 1.6.2 Welder Performance Qualifications (ASME Form QW-484 or equivalent) shall be submitted for Buyer review. This requirement shall also pertain to purchased items contracted by Seller.
- 1.6.3 Certified Material Test Reports (CMTRs) for filler metal shall be submitted for Buyer review.
- 1.6.4 Weld repair procedure shall be submitted for Buyer approval.
- 1.6.5 Final weld nondestructive examination (NDE) and inspection reports shall be submitted for Buyer review. These shall include visual inspection reports, NDE reports and radiography film.
- 1.6.6 Weld maps and weld procedure summary sheets shall be submitted for Buyer approval. They shall specifically identify each weld joint, welding procedure to be used and NDE requirements (sample form in Attachments A and B).

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

(Not Used)

PART 2 PRODUCTS

- 2.1 MATERIALS AND EQUIPMENT
- 2.1.1 Weld filler materials shall be in accordance with ASME Section II, Part C.
- 2.1.2 Weld filler materials shall be used so that the principal elements in the deposited weld metal shall be of the same nominal composition as the base metal.
- 2.1.3 Solid wires for automatic welding processes shall contain the principal alloying elements required for the deposited weld metal. Welds deposited by the submerged arc process shall not derive any principal element from the flux. No alloy fluxes shall be allowed.
- 2.1.4 Fluxes that the flux manufacturer recommends for single-pass shall not be used for multiple-pass welds.
- 2.1.5 Submerged arc welding shall be performed using the same name brand flux and the same name brand of ASME classification wire as used for the procedure qualifications.
- 2.1.6 Storage and handling of electrodes, fluxes and other welding materials after shipping containers are opened shall be in accordance with Seller's filler material control procedure. This procedure shall be in accordance with the guidelines of ASME Section II, Part C and the filler metal manufacturer's recommendation.
- 2.1.7 Tack welds shall be made with the equivalent type of electrode filler wire that is used for the root pass.
- 2.2 FABRICATION AND MANUFACTURE
- 2.2.1 General Requirements
- 2.2.1.1 Fabrication to this specification section shall be in accordance with the requirements of ASME Section VIII, Division 1.
 Conformance to this specification section and authorization of Welding Procedure Specifications and Procedure Qualification

Records shall in no way relieve Seller of the responsibility to provide welds which are sound and suited to the services for which they are intended.

- 2.2.1.2 Welding and nondestructive test symbols shall be in accordance with AWS A2.4.
- 2.2.1.3 Welding terms and definitions shall be in accordance with AWS A3.0.
- 2.2.1.4 Cleanliness shall be maintained during welding. All stubs, rods, flux, slag and other foreign material shall be removed from the weld area.
- 2.2.1.5 Peening of welds is not permitted.
- 2.2.1.6 All weld spatter, burrs, etc., shall be ground to a smooth contour.
- 2.2.1.7 Arc strikes, weld starts and stops shall be confined to the weld joint. Arc strikes found outside the weld joint that are deeper than 1/16 inch shall be welded to fill depression and then ground to a smooth contour. Those less than 1/16 inch shall be ground to a smooth contour.
- 2.2.1.8 Fabrication aids, temporary supporting lugs, etc., that are removed by gouging or cutting shall not be cut closer than 1/8 inch from the vessel surface. The remaining material shall then be ground flush with the base metal. The ground area shall be inspected for possible cracks or porosity by liquid penetrant examination. Examination shall be in accordance with Paragraph 3.2.6.
- 2.2.1.9 Nozzles, lugs, support rings and similar items shall not be located on a weld seam unless unavoidable. Buyer authorization shall be required if any attachment is to be located on weld seam.
- 2.2.1.10 Where double welded butt joints cannot be utilized the root pass welds shall be made with the GTAW process. Back purging gas shall be used during welding. The purge shall be maintained until at least 0.250 inch depth of weld metal has been deposited or the weld joint is filled, whichever is less. Purging shall be in accordance with AWS D10.11.
- 2.2.1.11 Tack welds in open butt joints shall be feathered into surrounding material. Cracked tack welds shall be removed.

5	
7075 H	
<u>C</u>	

- 2.2.2 Welding Qualifications
 2.2.2.1 Welding Procedure Space
- 2.2.2.1 Welding Procedure Specifications, Procedure Qualification Records and Welder Performance Qualifications shall be in accordance both with ASME Section IX and this specification section.
- 2.2.2.2 Welds deposited by procedures differing from those authorized shall be rejected and completely removed at Seller's cost.
- 2.2.2.3 At the request of the Buyer, any welder shall be retested and requalified when the work of said welder creates a reasonable doubt as to the quality of his/her workmanship.
- 2.2.3 Acceptable Welding Processes
- 2.2.3.1 Welding may be achieved by any one or combination of the following welding processes:

Welding Process

AWS Letter Designation

Shielded Metal Arc Welding

SMAW

Manual and Automatic Gas Tungsten Arc Welding

GTAW

Automatic Submerged Arc Welding

SAW

2.2.3.2 Other welding processes such as Gas Metal Arc, Manual Submerged Arc and processes employing flux-cored electrodes require specific written authorization by the Buyer. Submit all pertinent data and intended application of said process for evaluation.

PART 3 EXECUTION

3.1 PREPARATION

- 3.1.1 Weld joint preparation shall be made by mechanical means or thermal cutting. When thermal cutting is performed, the joint surfaces shall be ground to bright metal prior to welding. Oxyfuel cutting of stainless steel is not acceptable.
- Permanent backup strips are not permitted without specific written authorization from the Buyer. If temporary backup rings are used and then removed, the weld area shall be dressed and examined for cracks and other defects. Examination of the weld surfaces shall be performed visually and by the liquid penetrant method. Liquid penetrant examination shall be in accordance with Paragraph 3.2.6.

3.1.3 To minimize the contamination of stainless steel the Seller shall follow the requirements of Specification Section 13252 prior to and after welding.

- 3.1.4 All surfaces to be welded shall be free of paint, oil, dirt, scale, oxides and other foreign materials detrimental to weld soundness.
- 3.1.5 Joint edges and adjacent surfaces to be welded shall be wirebrushed. They shall then be cleaned with an ethyl alcohol or acetone dampened lint-free cloth before welding begins.
- 3.1.6 Wire brushes shall be made of 300 Series austenitic stainless steel. Clearly mark mechanical cleaning tools such as grinding wheels, files, deburring tools and wire brushes. Marking shall identify tools to be used on stainless steel only.
- 3.1.7 Grinding shall be done in such a method that overheating of base and weld metal is minimized. Heat tint is an indication of overheating. Abrasive disks and abrasive flapper wheels are preferred over grinding disks or continuous-belt grinders.
- 3.2 INSTALLATION, APPLICATION AND ERECTION
- 3.2.1 All welds shall be made in accordance with Contract Drawings and Seller's fabrication drawings.
- Flux, weld spatter and any slag shall be removed from each weld bead prior to depositing each succeeding pass.
- 3.2.3 Welding starts and stops in welds shall be held to a minimum.

 Each such stop shall be properly conditioned before continuing the welding. The use of starting and stopping plates is recommended where possible.
- 3.2.4 Each weld shall be continuously uniform in width and size through its full length. Welds shall be free of coarse ripples, grooves, overlap and undercut. Crevices and intermittent welds are not permitted because of increased chance of stress corrosion cracking.
- 3.2.5 Preheat and Interpass Temperature Control
- 3.2.5.1 For stainless steel the minimum preheat shall be 50°F. The maximum interpass temperature shall not exceed 350°F.

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> Inspection and Nondestructive Examination (NDE) 3.2.6

General Requirement 3.2.6.1

Specific NDE shall be as noted on Contract Documents. NDE methods, acceptance criteria and additional general requirements shall be in accordance with the following subparagraphs. All NDE, except visual examination, shall be performed by personnel certified in accordance with ASNT SNT-TC-1A.

3.2.6.2 Inspection

- Seller's welding inspector shall be certified in accordance Α. with AWS QC1 or equivalent authorized by Buyer.
- All weld inspection reports shall be maintained and submitted В. in accordance with Paragraph 1.6.

Visual Examination 3.2.6.3

- A. Visual examination shall be performed in accordance both with ASME Section V, Article 9 and this specification section.
- The welds to be examined, the evaluation of indications and В. the acceptance criteria shall be in accordance with ASME Section V, Article 9, Paragraphs T-950-1 and T-950-2, and ASME Section VIII, Division 1, Paragraph UW-35.
- Visual examination shall be performed on accessible surface С. of all completed welds.
- In addition to visual examination of completed welds, visual D. examination is required for all ground and blended welds.

3.2.6.4 Liquid Penetrant Examination

- Liquid penetrant examination procedures shall be in accordance with the requirements and methods specified in ASME Section V, Article 6.
- Penetrant materials shall meet the requirements of ASME В. Section V, Article 6, Paragraph T-625 for sulfur and halogen content regardless of the type of material to be examined.
- Liquid penetrant examination of welds shall include a band of base metal at least 1 inch wide on each side of the weld.
- The evaluation of indications and the acceptance criteria D. shall be in accordance with ASME Section VIII, Division 1, Appendix 8, Paragraphs 8.3 and 8.4 and Part UHA, Paragraph UHA-34.

3.2.6.5 Radiographic Examin	ıation
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- A. Radiographic examination procedures and techniques shall be in accordance with ASME Section V, Article 2.
- B. The acceptance criteria and extent of examination shall be in accordance with ASME Section VIII, Division 1, Paragraph UHA-33.
- 3.2.6.6 Ultrasonic Examination (UT)
 - A. Ultrasonic examination procedures and techniques shall be in accordance with the requirements and methods specified in ASME Section V, Article 5.
 - B. The acceptance criteria shall be in accordance with ASME Section VIII, Division 1.
- 3.3 FIELD QUALITY CONTROL

(Not Used)

3.4 ADJUSTMENTS

MI 5207.0568

- 3.4.1 Weld Repairs
- 3.4.1.1 All weld repairs shall be performed in accordance with the approved weld repair procedure.
- 3.4.1.2 Unacceptable indications shall be completely removed by chipping, gouging, grinding or other authorized methods (for the type of material being repaired) to clean, sound metal. The excavated areas shall be examined by the liquid penetrant method to assure complete removal of defects. Liquid penetrant examination shall be in accordance with Paragraph 3.2.6.
- 3.4.1.3 The repaired areas shall be reexamined using the same inspection procedures by which the defect was originally detected along with all other inspection called out for the particular weld.
- 3.4.1.4 Two repair attempts will be allowed on any one defective area. No further repair attempts shall be carried out without the authorization of Buyer.
- 3.5 CLEANING

(Not Used)

3.6 PROTECTION

(Not Used)

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3.7 DEMONSTRATION

(Not Used)

3.8 SCHEDULES

(Not Used)

END OF SECTION

ATTACHMENT A WELD MAP

Buyer P.O. No.

Item No.

Buyer Weld Specification No.

- 1. Draw a single line sketch of the pressure-retaining parts.
- 2. Identify each qualified welding procedure.

SKE	тсн
Seller Address Buyer PO#	
This Form Completed By Telephone No Revisions	Buyer Welding Eng. Review Block

ATTACHMENT B WELD PROCEDURE SUMMARY DATA

Space No.	Action to be Taken
1	Enter the Buyer's Purchase Order number. A separate summary must be completed for each P.O. and suborder.
2	Enter the Buyer's item number(s). The summary sheet must reflect all items of similar construction that will have common welding procedures. Items of markedly different materials or methods of Manufacture should be entered on separate WPS's.
3	Enter Seller's name.
4	Enter Seller's shop location where work will be performed.
5	Enter date summary is compiled.
6	Enter Buyer serial number and revision (Buyer's use only).
7	Enter Welding Procedure Specification (WPS) number.
8	Enter Procedure Qualification Record (PQR) number(s) supporting the WPS.
9	Enter the welding process(es) used in performing (PQR).
10	Enter type of joint as referenced in Legend. Where (E) is used, state type of joint or overlay in space 17.
11	Enter ASME-ASTM materials to be used in fabrication.
12	Enter base metal thickness range qualified by PQR.
13	Enter postweld heat treatment information in appropriate box.
14	Enter other pertinent information in this space. Such as impacts, etc.
15	Enter current review status of weld procedure (Buyer's use only).
16	Enter date of current review status of weld procedure (Buyer's use only).
17	Enter any special design or process information regarding the item of construction in this box.

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1/25/93 2:59pm

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ATTACHMENT B

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Welding Pressure Vessels

SERIAL NO.	PROCEDURE NO.	SUPPORTING PQR	PROCESS	JOINT TYPE	ASME-ASTM MATERIAL	THICKNESS QUALIFIED	PH YES	NO	COMMENTS	STATUS	DATE
6	7	8	9	10	11	12	[1	3]	14	15	16
		, , , , , , , , , , , , , , , , , , , 							W. (-	
		LE	GEND			REMARKS:					
JOINT TYPE DESCRIPTION A Longitudinal Seam B Circumferential Seam C Pipe Seam D Nozzle Seam E Other (Explain in comments section) REVIEW TYPE A Commence Fabrication B Commence Fabrication Submit w/Corrections C Do Not Fabricate									17		
SELLER:					_	SHOP LOCATION			4 DATE:5		
P.O. NO.:		1		ITE	M(S):		2				

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Advanced Technology Division
Fluor Contract 8457

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Welding Pressure Vessels

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		LE	GEND			REMARKS:														
	JOINT TYPE DESCRIPTION																			
B Ci C Pi D No	ongitudinal S ircumferentia ipe Seam uzzle Seam ther (Explain	eam 1 Seam In comments se	ection)																	
REVIEW TY	REVIEW TYPE																			
B Co	ommence Fabrio ommence Fabrio Submit w/Com o Not Fabrica	cation rrections									···									
SELLER:					_	SHOP LOCATION	:		DATE:											
P.O. NO.:				116	M(S)+															

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SECTION 05066
WELDING SPECIALTY EQUIPMENT
B-595-P-P33B-05066

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE Q-Q-93 ORIGINATOR:

CHECKER:

A. Estrada, Welding Engineer

Date

APPROVED BY:

K. B. &

Lead Discipline Engineer

1-26-93

Date

U.S. DEPARTMENT OF ENERGY Hanford Waste Vitrification Plant Richland, Washington

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SECTION 05066 WELDING SPECIALTY EQUIPMENT B-595-P-P33B-05066

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SECTION 05066 WELDING SPECIALTY EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

This specification section defines the welding, examination and testing requirements for shop fabrication of stainless steel specialty equipment in non-radioactive service.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A744/A744M

1991 Standard Specification for Casting, Iron-Chromium-Nickel,

Corrosion Resistant, for Severe Service

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
Boiler and Pressure Vessel Codes

ASME Section II,

1989 Material Specifications -

Part C

Welding Rods, Electrodes, and Filler

Metals

ASME Section V

1989 Nondestructive Examination

ASME Section VIII,

1989 Rules for Construction of Pressure

Division 1

Vessels

ASME Section IX

1989 Welding and Brazing Qualification

AMERICAN SOCIETY OF NONDESTRUCTIVE TESTING (ASNT)

ASNT SNT-TC-1A

1988 Recommended Practice - Personnel

Qualification and Certification in

Nondestructive Testing

AMERICAN WELDING SOCIETY (AWS)

AWS A2.4

1986 Standard Symbols for Welding,

Brazing and Nondestructive

Examination

AWS A3.0

1989 Welding Terms and Definitions

1/25/93 3:06pm 106\VOL5...\SPECS\P33B0506.60

P33B-05066-1

122 to

AWS D10.11

1987 Recommended Practices for Root

Pass Welding of Pipe Without

Backing

AWS QC1

1988 Standard for AWS Certification

of Welding Inspectors

1.3 RELATED REQUIREMENTS

Specification Section 13252

Precautions for Fabrication, Handling and Storage of Stainless

Steel and Nickel Alloys

1.4 DEFINITIONS

CMTR - Certified Material Test Report

NDE - Nondestructive Examination

1.5 SYSTEMS DESCRIPTION

(Not Used)

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

- Welding Procedure Specifications (ASME Form QW-482 or equivalent) and Procedure Qualification Records (ASME Form QW-483 or equivalent) shall be submitted for Buyer approval. This requirement shall also pertain to purchased items contracted by Seller. They shall be in accordance both with the requirements of ASME Section IX and this specification section. Seller shall review their contractor's procedures prior to submittal to verify their conformance to the requirements of this specification section.
- 1.6.2 Welder Performance Qualifications (ASME Form QW-484 or equivalent) shall be submitted for Buyer review. This requirement shall also pertain to purchased items contracted by Seller.
- 1.6.3 Certified Material Test Reports (CMTRs) shall be submitted for Buyer review.
- 1.6.4 Weld repair procedures shall be submitted for Buyer approval.
- 1.6.5 Final weld nondestructive examination (NDE) and inspection reports shall be submitted for Buyer review. These shall include visual inspection reports, NDE reports and radiographic film.

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> CLASSIFICATION OF SYSTEMS AND COMPONENTS 1.7

> > (Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

(Not Used)

PART 2 PRODUCTS

- 2.1 MATERIALS AND EQUIPMENT
- Matching weld filler materials shall be in accordance with ASME 2.1.1 Section II, Part C.
- Weld filler materials shall be used so that the principal elements 2.1.2 in the deposited weld metal shall be of the same nominal composition as the base metal.
- 2.1.3 Solid wires for automatic welding processes shall contain the principal alloying elements required for the deposited weld metal. Welds deposited by the submerged arc process shall not derive any principal alloying elements from the flux. Alloy flux shall not be used.
- 2.1.4 Fluxes that the flux manufacturer recommends for single-pass shall not be used for multiple-pass welds.
- 2.1.5 Submerged arc welding shall be performed using both the same name brand flux and the same name brand of ASME classification wire as used for the procedure qualifications.
- Storage and handling of electrodes, fluxes and other welding 2.1.6 materials after shipping containers are opened shall be in accordance with Seller's filler materials control procedure. This procedure shall be in accordance with the guidelines of ASME Section II. Part C and the filler metal manufacturer's recommendations.
- 2.1.7 Tack welds shall be made with the equivalent type of filler wire that is used for the root pass.
- 2.1.8 Temporary backup rings or strips, when required on the Contract Drawings, shall be of the same nominal composition as the base material.

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2.2	FABRICATION	AND	MANUFACTURE
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- General Requirements 2.2.1
- Fabrication to this specification section shall be in accordance 2.2.1.1 with the requirements of ASME Code Section VIII, Division 1 whether or not the equipment will be code stamped. Conformance to this specification section and authorization of Welding Procedure Specifications and Procedure Qualification Records shall in no way relieve Seller of the responsibility to provide welds which are sound and suited to the services for which they are intended.
- Welding and nondestructive test symbols shall be in accordance 2.2.1.2 with AWS A2.4.
- Welding terms and definitions shall be in accordance with 2.2.1.3 AWS A3.0.
- Cleanliness shall be maintained during welding. All stubs, rods, 2.2.1.4 flux, slag and other foreign material shall be removed from the weld area.
- All weld spatter, burrs, etc. shall be ground to a smooth contour. 2.2.1.5
- Where double welded butt joints cannot be utilized, the root pass 2.2.1.6 welds shall be made by the GTAW process with back purging gas. The purge shall be maintained until at least 0.250 inch depth of weld metal has been deposited or the weld joint is filled, whichever is less. Purging shall be in accordance with AWS D10.11.
- Arc strikes, weld starts and stops shall be confined to the weld 2.2.1.7 joint. Arc strikes found outside the weld joint that are deeper than 1/16 inch shall be welded to fill depression and then ground to a smooth contour. Those less than 1/16 inch shall be ground to a smooth contour.
- Tack welds in open butt joints shall be feathered into surrounding 2.2.1.8 material. Cracked tack welds shall be removed.
- 2.2.2 Welding Qualifications
- 2.2.2.1 Welding procedures, welders, welding operators and tackers shall be qualified in accordance with ASME Section IX.
- 2.2.2.2 At the request of the Buyer, any welder shall be retested and requalified when the work of said welder creates a reasonable doubt as to the quality of his/her workmanship.

The format of welding procedure specifications, welding procedure
qualification records and nondestructive inspection reports shall
be in accordance with ASME Section IX, Appendix A.

- 2.2.2.4 Welding shall not start until Welding Procedure Specifications including Procedure Qualification Records and Weld Repair Procedure are returned to Seller from Buyer with authorization to proceed. Weld performed by procedures differing from those authorized, or by non-qualified personnel, are subject to complete removal.
- 2.2.3 Acceptable Welding Processes
- 2.2.3.1 Welding may be achieved by any one or combination of the following welding processes:

Welding Process	<u>AWS Letter Designation</u>
Shielded Metal Arc Welding	SMAW
Flux-Cored Arc Welding (with Shielding Gas)	FCAW
Manual and Automatic Gas Tungsten Arc Welding	GTAW
Gas Metal Arc Welding (Spray Transfer)	GMAW
Automatic Submerged Arc Welding	SAW

2.2.3.2 Other welding processes such as Manual Submerged Arc and Gas Metal Arc (Short Circuit Transfer) require specific written authorization by the Buyer's Welding Engineer. Submit all pertinent data and intended application of said process for evaluation.

PART 3 EXECUTION

3.1 PREPARATION

- 3.1.1 Weld joint preparation shall be made by machining, grinding or thermal cutting. When thermal cutting is performed the joint surfaces shall be ground to bright metal prior to welding. Oxyfuel cutting of stainless steel is not acceptable.
- 3.1.2 Permanent backup strips or backing rings are not permitted without specific written authorization from Buyer. If temporary backup strips are used and then removed, the weld area shall be dressed and liquid penetrant examined for cracks and other defects.

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Liquid penetrant examination shall be in accordance with Paragraph 3.2.6.

- 3.1.3 To minimize the contamination of stainless steel Seller shall follow the requirements of Specification Section 13252 prior to and after welding.
- 3.1.4 All surfaces to be welded shall be free of paint, oil, dirt, scale, oxides and other foreign materials detrimental to weld soundness.
- 3.1.5 For stainless steel joint edges and adjacent surfaces to be welded shall be wire-brushed. They shall then be cleaned with an ethyl alcohol or acetone dampened lint-free cloth before welding begins.
- 3.1.6 Wire brushes used on stainless steel welds shall be made of 300 Series stainless steel. Clearly mark mechanical cleaning tools used on stainless steel such as grinding wheels, files, deburring tools and wire brushes. Marking shall identify tools to be used on stainless steel only.
- 3.1.7 Grinding shall be done in such a method that overheating of base and weld metal is minimized. Heat tint is an indication of over heating. Abrasive disks and abrasive flapper wheels are preferred over grinding disks or continuous-belt grinders.
- 3.2 INSTALLATION, APPLICATION AND ERECTION
- 3.2.1 All welds shall be made in accordance both with Contract Drawings and Seller's fabrication drawings.
- 3.2.2 Preheat and Interpass Temperature Control
- 3.2.2.1 For austenitic stainless steel the minimum preheat shall be 50°F.
- 3.2.2.2 Interpass temperature for austenitic stainless steel shall not exceed 350°F.
- 3.2.3 Flux, weld spatter and any slag shall be removed from each weld bead prior to depositing each succeeding pass.
- 3.2.4 Welding starts and stops in welds shall be held to a minimum.

 Each such stop shall be properly conditioned before continuing the welding. The use of starting and stopping plates is recommended where possible.
- 3.2.5 Each weld shall be continuously uniform in width and size through its full length. Welds shall be free of coarse ripples, grooves, overlap and undercut. Crevices and intermittent welds are not permitted because of increased chance of stress corrosion cracking.

- 3.2.5.1 All required finish machining shall be done after heat treatment.
- 3.2.6 Inspection and Nondestructive Examination

Specific nondestructive examination shall be performed in accordance with Seller's fabrication drawings. NDE methods, acceptance criteria and additional general requirements shall be in accordance with the following subparagraphs. All NDE, except visual examination, shall be performed by personnel certified in accordance with ASNT SNT-TC-1A.

3.2.6.1 Inspection

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- A. Seller's welding inspector shall be certified in accordance with AWS QC1 or equivalent authorized by Buyer.
- B. All weld inspection reports shall be submitted in accordance with Paragraph 1.6.

3.2.6.2 Visual Examination

- A. Visual examination shall be performed in accordance both with ASME Section V, Article 9 and this specification section.
- B. Visual examination shall be performed on an accessible surface of all completed welds.
- C. The welds to be examined, the evaluation of indications and the acceptance criteria shall be in accordance with ASME Section V, Article 9, Paragraphs T-950-1 and T-950-2 and ASME Section VIII, Division 1, Paragraph UHA-34.

3.2.6.3 Liquid Penetrant Examination

- A. Liquid penetrant examination procedures shall be in accordance with the requirements and methods specified in ASME Section V, Article 6.
- B. Penetrant materials shall meet the requirements of ASME Section V, Article 6, Paragraph T-625, for sulfur and halogen content regardless of the type of material to be examined.
- C. Liquid penetrant examination of welds shall include a band of base metal no less than 1 inch wide on each side of the weld. Liquid penetrant examination shall be performed after welds have been ground and visually examined.

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- The evaluation of indications and the acceptance criteria shall be in accordance with ASME Section VIII, Division 1, Appendix 8. Paragraphs 8.3 and 8.4.
- 3.2.6.4 Ultrasonic Examination
 - A. Ultrasonic examination procedures shall be in accordance with the requirements and methods specified in ASME Section V, Article 5.
 - В. The acceptance criteria shall be in accordance with ASME Section VIII, Division 1, Appendix 12, Paragraph 12.3.
- 3.2.6.5 Radiographic Examination
 - Radiographic examination procedures and techniques shall be Α. in accordance with ASME Section V, Article 2.
 - The extent of examination acceptance criteria shall be В. in accordance with ASME Section VIII, Division 1, Paragraph UW-51.
 - С. Composite viewing of double film exposure is not permitted unless prior acceptance is granted by Buyer for each application.
- 3.3 FIELD QUALITY CONTROL

(Not Used)

- 3.4 **ADJUSTMENTS**
- 3.4.1 Weld Repairs
- 3.4.1.1 All weld repairs shall be performed in accordance with the approved weld repair procedures.
- 3.4.1.2 Unacceptable indications shall be completely removed by chipping. gouging, grinding or other authorized methods (for the type of material being repaired) to clean, bright metal. The excavated areas shall be examined by the liquid penetrant method to assure complete removal of defects. Liquid penetrant examination shall be in accordance with Paragraph 3.2.6.
- 3.4.1.3 The repaired areas shall be reexamined using the same inspection procedures by which the defect was originally detected and all other inspection called out for the particular weld.
- Two repair attempts will be allowed on any one defective area. 3.4.1.4 No further repair attempts shall be carried out without the authorization of Buyer.

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3.4.1.5	For stainless steel casting, prior Buyer approval of major weld repair is required. Major weld repair shall be in accordance with ASTM A744/A744M.
3.5	CLEANING
	(Not Used)
3.6	PROTECTION
	(Not Used)
3.7	DEMONSTRATION
	(Not Used)
3.8	SCHEDULES
	(Not Used)

END OF SECTION

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SECTION 13252 PRECAUTIONS FOR FABRICATION, HANDLING AND STORAGE OF STAINLESS STEEL AND NICKEL ALLOYS B-595-P-P33B-13252

APPROVED FOR CONSTRUCTION

ISSUE DATE $\frac{0}{2-2-93}$	QUALITY LEVEL I II X SAFETY CLASS 1 2 3_X 4
ORIGINATOR:	CHECKER:
A. Estrada, Welding Engineer Date	D. A. Buzzelli tod Disc Checker Date
APPROVED BY:	
R. B. Euckson C. J. Divona Lead Discipli	ine Engineer Date

SECTION 13252 PRECAUTIONS FOR FABRICATION, HANDLING AND STORAGE OF STAINLESS STEEL AND NICKEL ALLOYS B-595-P-P33B-13252

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SECTION 13252 PRECAUTIONS FOR FABRICATION, HANDLING AND STORAGE OF STAINLESS STEEL AND NICKEL ALLOYS

PART 1 GENERAL

SUMMARY 1.1

This specification section defines the requirement for handling. fabrication, shipment and storage of stainless steel and nickel alloys to minimize the risk of contamination.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A380

1978 Standard Practice for Cleaning and

Descaling Stainless Steel Parts,

Equipment, and Systems

ASTM D129

1991 Standard Test Method for Sulfur in

Petroleum Products (General Bomb Method)

ASTM D808

1991 Standard Test Method of Chlorine in

New and Used Petroleum Products (Bomb

Method)

ASTM D1552

1990 Standard Test Method for Sulfur in Petroleum Products (High-Temperature

Method)

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME N45.2.1

1980 Cleaning of Fluid Systems and Associated Components for Nuclear Power

Plants

Boiler and Pressure Vessel Code

ASME Section V

1989 Nondestructive Examination

CODE OF FEDERAL REGULATIONS (CFR)

40 CFR. Chapter 1

1990 National Secondary Drinking Water

Part 143 Regulations

1.3 RELATED REQUIREMENTS

(Not Used)

1.4 DEFINITIONS

MIC - Microbiological Influenced Corrosion

ppm - Parts Per Million

SCC - Stress Corrosion Cracking

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirement section of the Order/Subcontract.

- 1.6.1 Seller's procedure for handling, cleaning, isolation and storage of stainless steel and nickel alloys. These procedures shall be submitted for Buyer approval.
- 1.6.2 Material safety data sheet shall be submitted for materials that are not intended to be removed after fabrication. Examples of these materials are: lubricants, thread compound, nondestructive examination materials, etc. Submit for Buyer review.
- 1.6.3 Seller's procedure for drying of equipment shall be submitted for Buyer approval. The procedure shall identify the means of verifying that all water has been dried from pockets and low points after hydrostatic testing.
- 1.6.4 Biocide water treatment procedure shall be submitted for Buyer approval.
- 1.6.5 Water chemistry and biocide material data sheet shall be submitted for Buyer approval. This information shall be submitted prior to hydrostatic testing.
- 1.6.6 Procedure for the isolation and separation of stainless steel wire brushes and grinding material shall be submitted for Buyer approval.
- 1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

(Not Used)

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- 2.1.1 All limitations specified, e.g., percent, parts per million (ppm) etc. are to be by weight.
- 2.1.2 All consumables and materials used during fabrication shall meet the following general requirements unless addressed in more detail in this specification section:
- 2.1.2.1 Maximum chloride content shall be 250 ppm.
- 2.1.2.2 Maximum sulfur content shall be 1 percent.
- 2.1.2.3 Low melting point elements (such as cadmium, lead, mercury, tin and zinc) shall not be added.
- 2.1.3 Carbon Steel Contamination
- 2.1.3.1 Tools and equipment used to cut, form and handle stainless steel and nickel alloys shall be in accordance with one of the following requirements:
 - A. Tools and equipment shall either be hardened tool steel or chrome-plated steel.
 - B. Surfaces of non-stainless steel tools and equipment which come into contact with stainless steel shall be covered either with paper, plastic or stainless steel sheet.
- 2.1.3.2 Grinding equipment and stainless steel wire brushes previously used on carbon steel shall not be used on stainless steel and nickel alloys.
- 2.1.3.3 Temporary attachments for welding or fabrication shall be of a similar grade material (e.g., 300 series stainless steel shall be used for a temporary attachment to 304L stainless steel) to the pressure component.
- 2.1.3.4 If scaffolding or ladders are used during fabrication, the contact surfaces at the stainless steel or nickel alloy interface shall be protected either by wood or plastic. No direct contact shall be permitted.
- 2.1.3.5 Areas used for fabrication of stainless steel and nickel alloys shall be separate from carbon steel fabrication areas. These areas shall be kept free of carbon steel shavings and grinding dust.
- 2.1.3.6 Where it is not possible to provide protection from carbon steel, the component shall be chemically cleaned to dissolve any carbon steel which may be embedded in the stainless steel or nickel

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> alloy. The acceptable amount of contamination and cleaning requirement shall be in accordance with Paragraph 2.1.3.10.

- 2.1.3.7 Non-metallic slings shall be used when safe to do so. Lifting with carbon steel chains from lifting lugs is acceptable.
- 2.1.3.8 Carbon steel strapping material used for shipping shall not contact stainless steel or nickel alloy equipment or piping.
- 2.1.3.9 Walking directly upon stainless steel surfaces shall be prohibited where possible. Surfaces upon which walking access is required shall be protectively covered.
- 2.1.3.10 Acceptable Carbon Steel Contamination

Scattered areas of carbon steel contamination (as evident by rust) are permissible provided the aggregate area does not exceed 2 sq. in. in any 1 sq. ft. area. Carbon steel contamination shall be verified in accordance with ASTM A380.

Surfaces that are found to be contaminated with carbon steel shall be restored. Mechanical and chemical descaling is acceptable. Cleaning shall be performed in accordance with ASTM A380.

- 2.1.4 Wrapping and Protective Covering Materials
- 2.1.4.1 No chloride restriction shall apply to wrapping and protective covering material (such as polyethylene and polyvinyl chloride (PVC) films) when used for packaging or storage purposes. PVC caps, plugs and packaging material shall not be reused.
- 2.1.4.2 No chloride restriction shall apply to pressure-sensitive tapes or adhesive-backed tapes. Pressure-sensitive tapes or adhesive-backed tapes shall not be used within 12 inches of any area where local heating or welding may increase the metal temperature to 180°F or higher.
- Where tape is used during welding for back purging, the tape shall 2.1.4.3 be of a low-chloride (less than 250 ppm) type (Stockwell Rubber Company G-568 or equal).
- 2.1.4.4 After pressure-sensitive and adhesive-backed tapes are no longer required they shall be removed. Any remaining residual adhesive shall be removed. Acetone shall be used.
- 2.1.5 Grinding Discs, Abrasive Discs, Brushes and Material Removal Tools
- 2.1.5.1 Grinding discs, abrasive discs and brushes shall be designated for use on stainless steel and nickel base alloys. These materials shall not have been previously used on carbon steel, low allow steels or nonferrous metals and their alloys.

- Grinding discs, abrasive discs and belts shall be of resin bonded 2.1.5.2 alumina, silicon carbide or zirconium carbide. Sulfurized compounds shall not be used as a bonding material.
- 2.1.5.3 Only 300 series stainless steel brushes shall be used on stainless steel and nickel base alloys.
- 2.1.5.4 All material removal and cleaning tools shall be marked to identify that they are to be used on stainless steel and nickel alloys only.
- 2.1.6 Nondestructive Examination Materials
- 2.1.6.1 Sulfur and halogen content of liquid penetrant materials shall be in accordance with the requirements of ASME Section V, Article 6, T-625.
- 2.1.7 Cleaning Fluids

Chlorinated hydrocarbon solvents may be used for stainless steel cleaning provided they are analyzed for total residual chlorine and sulfur. The analysis process is as follows:

- Α. Select and weigh a glass Petri dish of 150mm nominal diameter. Note the weight.
- В. Pour a 100 gram sample of the solvent into the Petri dish.
- С. Heat the sample for 60 minutes. The heating temperature shall be between 194°F and 212°F, inclusive.
- D. Weigh the Petri dish again. Subtract the weight noted in Step A from the new weight. This is the weight of the solvent residue.
 - 1) If the residue is less than 0.005 grams, the solvent is acceptable. No further analysis is required.
 - If the residue weight is 0.005 grams or more, repeat 2) Steps A through C. Test the residue in accordance with ASTM D129 or ASTM D1552 for sulfur content. Test the residue in accordance with ASTM D808 for halogen content.

The sulfur or chlorine content shall not exceed 1 percent of this residue by weight in any case.

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2.2 FABRICATION AND MANUFACTURE

Hydrostatic Test Water Quality 2.2.1

> The intent of the following guidelines is to minimize the risk of chloride stress corrosion cracking (SCC) and microbiological influenced corrosion (MIC).

- Water quality shall meet the following requirements for equipment 2.2.2 that can be drained and completely dried or when specified by the Contract Documents.
- Water used for testing shall be clean, filtered, chlorinated 2.2.2.1 water. The free residual chlorine content of this water shall not be more than 0.1 ppm. It shall be in accordance with the following water chemistry and requirements:
 - pH at 77°F shall be 5.5 to 8.0. Α.
 - Chloride content shall be less than 250 ppm. B.
 - Fluoride content shall be less than 5 ppm. С.
 - D. Sulfide content shall be less than 1 ppm.
 - Total dissolved solids shall be less than 500 ppm. Ε.
 - Treated with a biocide for the specific normal population of F. bacteria.

Potable water which meets the Code of Federal Regulations 40 CFR, Chapter 1, Part 143 requirements should satisfy these chemistry limits.

The test water shall be analyzed before equipment is filled. The water's free residual chlorine content shall be determined.

- Test water and equipment surface temperature shall not exceed 2.2.2.2 140°F at any time during hydrostatic test or drying operations. If a temperature in excess of 140°F is necessary to dry equipment, dejonized water shall be used. Dejonized water shall meet the requirements of Paragraph 2.2.3.
- 2.2.2.3 Equipment shall be completely drained and dried within 48 hours of hydrostatic testing. Acceptable methods of drying include mopping, wiping or blow drying with cool (less than 140°F) nitrogen. Seller shall submit a drying procedure in accordance with Paragraph 1.6.3.

- 2.2.3 Deionized water shall be used for hydrostatic testing of equipment that can only be dried through evaporation or when specified in Contract Documents. The water and methods shall be in accordance with the following paragraphs:
- 2.2.3.1 Deionized water shall meet the following requirements:
 - A. pH at 77°F shall be 5.5 to 8.0.
 - B. Chloride content shall be less than 1 ppm.
 - C. Fluoride content shall be less than 1 ppm.
 - D. Sulfide content shall be less than 1 ppm.
 - E. Conductivity at 77°F shall not exceed 3 micromho/cm.
 - F. Silica content shall not exceed 0.05 ppm.
 - G. Total suspended solids shall not exceed 3 ppm.
 - H. Treated with a biocide for the specific normal population of bacteria.

Steam condensate or demineralized water should satisfy the above requirements. The above water chemistry requirements are in accordance with ASME N45.2.1.

The test water shall be analyzed before equipment is filled.

- 2.2.3.2 All equipment shall be sealed and maintained in clean condition once testing is complete.
- 2.2.3.3 Any hydrostatic test condition or procedure not addressed by the above paragraphs shall be submitted for Buyer approval prior to the start of testing.
- 2.2.4 Extended Hydrostatic Test

| |

- 2.2.4.1 If equipment is subjected to extended hydrostatic test or wet layup condition (greater than 72 hours) the test water shall be analyzed for microbiological contamination. An acceptable biocide test kit shall be used (Bioindustrial Technologies Incorporated MICKITM or equal).
- 2.2.4.2 If necessary, the water shall be treated on a daily basis with a biocide to minimize the risk of microbiological contamination. Examples of acceptable biocides are chlorine (0.2 ppm) and hydrogen peroxide. Seller shall select the proper biocide according to the analyzed water chemistry. Seller shall submit a material safety data sheet on the intended biocide.

2.2.5 Cleaning Requirements

All surfaces to be welded shall be free of paint, oil, grease, dirt and other foreign materials detrimental to the weld soundness. An area 4 inches wide minimum on each side of weld joint shall be cleaned. Acceptable cleaning methods shall be mechanical or chemical methods in accordance with ASTM A380.

PART 3 EXECUTION

3.1 **PREPARATION**

(Not Used)

- 3.2 INSTALLATION, APPLICATION AND ERECTION
- After welding all foreign materials such as flux, anti-spatter 3.2.1 compound, slag and spatter shall be removed. Removal can be accomplished either by mechanical or chemical methods.
- Heat tint (dark blue coloring) and scale shall be permitted on nonprocess side of weld joint. Light heat tint (straw or gold 3.2.2 colored) shall be permitted on the process side of weld joint. When required, heat tint and scale can be removed either by mechanical or chemical descaling methods. For mechanical descaling, precleaning and postcleaning is required.
- 3.2.3 Liquid penetrant and ultrasonic examination materials shall be completely removed from surface after examination. Removal shall be in accordance both with manufacturer's recommendation and this specification section.
- 3.3 FIELD QUALITY CONTROL

(Not Used)

3.4 **ADJUSTMENTS**

(Not Used)

3.5 CLEANING

(Not Used)

3.6 **PROTECTION**

(Not Used)

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3.7 **DEMONSTRATION**

(Not Used)

3.8 SCHEDULES

(Not Used)

END OF SECTION

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SECTION 13433 PRESSURE VESSELS - STAINLESS STEEL B-595-P-P33B-13433

APPROVED FOR CONSTRUCTION

ISSUE DATE $\frac{0}{2-2-93}$	WAPA YES NO X QUALITY LEVEL I II X SAFETY CLASS 1 2 3_X 4
ORIGINATOR:	CHECKER:
M. C. Sanvictores, Vessel Engineer Date	D.A. Buzzelli, tend bisc. Checker Date
APPROVED BY:	
R.B. Exictson C. J. Divona Lead Discipline En	<u>1-26-93</u> Date

U.S. DEPARTMENT OF ENERGY Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

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SECTION 13433 PRESSURE VESSELS - STAINLESS STEEL B-595-P-P33B-13433

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SECTION 13433 PRESSURE VESSELS – STAINLESS STEEL

PART 1 GENERAL

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1.1 SUPPLARY

This specification section covers the minimum requirements for the design, fabrication, inspection and testing of stainless steel vessels and appurtenances.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.5

1988 Pipe Flanges and Flanged Fittings

ANSI Y14.5M

1982 Dimensioning and Tolerancing

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A380

1988 Standard Practice for Cleaning and

Descaling Stainless Steel Parts,

Equipment, and Systems

ASTM A480/A480M

1991 Standard Specification for General Requirements for Flat-Rolled Stainless and

Heat-Resisting Steel Plate, Sheet, and

Strip

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) Boiler and Pressure Vessel Code

ASME Section II,

1989 Material Specification-Ferrous

Materials

ASME Section VIII,

1989 Rules for Construction of

Division 1

Part A

Pressure Vessels

UNIFORM BUILDING CODE (UBC)

UBC

1988 Uniform Building Code

1.3 RELATED REQUIREMENTS

Specification Section 05063 Welding Pressure Vessels

Specification Section 13252 Precautions for Fabrication, Handling and Storage of Stainless Steel and Nickel Alloys

CONTRACT DRAWINGS

Drawings as listed in Attachment D

1.4 DEFINITIONS

CMTR - Certified Material Test Report

DP - Design Pressure

MAWP - Maximum Allowable Working Pressure

NDE - Nondestructive Examination

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 Shop Drawings

- A. Dimensional details with applicable tolerances in accordance with ANSI Y14.5M.
- B. Detailed bill of materials.
- C. General arrangement, assembly or outline drawings. These drawings shall include the following information:
 - 1) ASME code edition and addenda.
 - 2) Coincident design pressure and temperature to be stamped on the nameplate.
 - Hydrostatic test pressure in psig.
 - 4) Basis for the calculated test pressure and the limiting part.
 - 5) The vessel nameplate and all its markings.
 - Corrosion allowance and location.

9)

Welded joint efficiency.

- /) werded joint erriciency.
- Vessel name and equipment number.
- 10) Listing of additional drawings.
- 11) Requirements for nondestructive examination (NDE).

Standards, specifications and welding procedures.

- 12) Details of weld preparations and location of all circumferential and longitudinal weld seams.
- 13) Cleaning, surface preparation and labeling requirements.
- 14) Total fabricated weight of vessels, in pounds (round up to 3 significant figures or to hundreds of pounds).
- 15) Vessel's center of gravity.
- D. Vessel elevation. This elevation shall indicate shell thickness, head thickness, shell-to-head transition and vessel supports.
- E. Lifting lug calculations and lifting lug reinforcement to vessels.
- F. Details of internal appurtenances, weld details, reinforcements, dimensions, finishes and applicable tolerances.
- G. Details for parts. These shall show the following additional information:
 - 1) Material of construction. This shall include nominal and finished minimum thicknesses.
 - 2) Details of all weld joint preparation, applicable weld procedure number and NDE requirements.
- 1.6.2 ASME Code Documents and Special Requirements

Documents submitted to Buyer pertaining to ASME code certification, material and quality control records shall include the following:

- A. Hydrostatic test pressure chart for each vessel.
- B. Photograph of the actual nameplate for each vessel.

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- C. Pressure vessel material record which shall be completed for each vessel (refer to Attachment A). This record shall include:
 - 1) An outline sketch of the vessel or an equivalent method of identification. This shall show the location of the principal pressure-retaining parts (shells and heads).
 - The primary material record for all pressureretaining parts made from plate, any nonpressure part required to be made from same plate material as the shell, seamless pipe used as a shell or sump and any pressure-retaining part whose material specification does not provide for the marking of each mill product piece [see ASME Section VIII, Division 1, Paragraph UG-93(a)(3)].
 - The miscellaneous material record. This shall list the complete material specification designation when the material specification of a pressure-retaining part provides for the marking of each piece [see ASME Section VIII, Division 1, Paragraph UG-93(a)(2)] and for all nonpressure-retaining parts not listed in the primary material records.
 - 4) The "Pressure Vessel Material Record" (Attachment A) form shall be signed by an authorized representative of the vessel manufacturer's quality control department.
- D. Seller shall include two copies of the records of inspections and tests performed by Seller with each shipment of article(s). These shall include records of the results of each inspection and test performed.
- E. Certified Material Test Reports (CMTRs) shall be submitted in accordance with Paragraph 2.1.2.I.
- 1.6.3 Design Calculations

Seller shall be responsible for the complete design of the pressure vessel. Seller shall submit appropriate calculations that demonstrate the adequacy of the design to resist the design loadings specified in Paragraph 2.1.3 in accordance both with ASME Section VIII, Division 1 and this specification section.

1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

or macro and acognaphic of the contributions											
Α.	Site	Elevation	714 feet above sea level								
В.	Barome	Barometric Pressure 14.3 psia									
c.	Outside Design Temperature										
	1)	Maximum Design Temperature	110°F								
	2)	Minimum Design Temperature	-20°F								
	3)	Wet Bulb Design Temperature	68°F								
D.	Operat	ting Environment									
	1)	Normal Temperature	60°F to 104°F								

2) Maximum Temperature 104°F

3) Relative Humidity Not controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General

Pressure vessels described in this specification section and as shown on drawings listed in Attachment D shall be completely shopmanufactured. Each item shall be designed, fabricated, inspected, tested and certified in accordance both with ASME Section VIII, Division 1 and this specification section. Code stamping requirements shall be in accordance with drawings listed in Attachment D.

2.1.2 **Materials**

- Α. All materials shall be of the material specification, grade and condition in accordance with the Contract Drawings listed in Attachment D. All pressure-retaining materials shall be in accordance with ASME Section II unless specified otherwise.
- В. All stainless steel materials shall be fully annealed in accordance with ASME Section II, Part A, Material Specification.

- C. Stainless steel plate material shall be Number 1 finish with a hot-rolled, annealed, pickled and surface-cleaned finish in accordance with ASTM A480/A480M. Other forms of material shall have similar form of finish.
- Material shall be ordered with all surfaces in the iron-free D. condition. This condition shall be maintained throughout all phases of fabrication. The recommendation of ASTM A380, Section 8, shall be followed for the prevention of contamination.
- Ε. No substitution of materials shall be permitted.
- F. No welding repair of material defects shall be made without Buyer approval in each specific case.
- Nozzle necks that are fabricated from plate shall be the G. same material specification and grade as the vessel shell or head to which they are attached.
- Н. Materials for external supports and clips welded directly to shell or head shall be the same type as specified for the vessel part to which they are attached.
- Ι. CMTRs shall be provided for all plate, sheet, piping, tubing, flanges and fittings that come into contact with the process liquid.
- J. If fabrication requires that the original identification markings be removed or if the material is divided into two or more parts, one of the following identification procedures shall be effected. This is to assure identification of all materials both during fabrication and on the as-built drawings.
 - 1) One set of markings shall be accurately transferred to another location on the material.
 - 2) A coded marking shall be placed on the material.

2.1.3 Design

2.1.3.1 General

- A. Coincident design pressure and temperature shall be in accordance with the Contract Drawings. This will be the design pressure and temperature stamped on the vessel nameplate. Maximum Allowable Working Pressure (MAWP) shall be equal to Design Pressure (DP).
- В. Shop hydrostatic test pressure shall be 1.5 times MAWP.

- C. The material thicknesses specified on the Contract Drawings for the equipment item number are minimum nominal dimensions including corrosion allowance. These are based on design analysis. The analysis considers all loadings to which the pressure vessel is expected to be subjected. Under no circumstances shall any specified material thickness be reduced. Additional material shall be added to the specified thickness of any component subject to thinning due to forming.
- D. Corrosion allowance for vessel shell, heads and nozzle necks shall be in accordance with the Contract Drawings. Corrosion allowance for nonremovable internal parts shall be the same as the vessel applied to all exposed surfaces. The minimum corroded thickness shall be no less than 1/8 inch.
- E. All internal and external attachments shall either be full-penetration welded or completely seal-welded. All details shall allow for complete drainage without pockets. Reinforcing pads shall have tapped holes plugged and seal-welded prior to shipment after all required testing has been completed.
- F. The vessel lifting lugs shall be designed for a load that is 150 percent of the dry weight of the total assembled unit. Calculations shall be submitted for Buyer approval prior to lifting lug fabrication.

2.1.3.2 Connections

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- A. The number, sizes, location and material shall be in accordance with the Contract Drawings.
- B. Nozzle flanges shall be in accordance with ANSI B16.5. Nozzle mark item number as shown on the Contract Drawings shall be stenciled at the side of all the flanges.
- C. The bore of nozzle necks, attachment pipe and flanges shall match or be tapered to match in accordance with ASME Section VIII, Division 1. The minimum thickness after tapering shall be not less than that required by ASME Section VIII, Division 1.
- D. Nozzle attachment welds made in accordance with ASME Section VIII, Division 1, Paragraph UW-3, Categories "B" and "D" shall be full-penetration welds through the thickness.
- E. The finish of the gasket contact surface of flange facings shall be in accordance with ANSI B16.5 unless otherwise shown on Contract Drawings.

- f. The minimum neck thickness for manholes and inspection openings shall be in accordance with ASME Section VIII, Division 1 requirements for nozzles.
- 6. Flange bolt hole orientation shall be in accordance with Attachment B of this specification section.

2.1.3.3 Seismic Design

Seismic design shall be in accordance with the provision of the Uniform Building Code (UBC) for nonstructural components supported by structures (Section 2312g) for UBC Zone 2b. The static horizontal seismic force (F_p) applied at the center of gravity in the direction under consideration shall be determined from the following equation:

Consideration shall be made for the effects of vessel content sloshing during a seismic event.

2.2 FABRICATION AND MANUFACTURE

2.2.1 Ceneral

- Cleaning of stainless steel and its handling during fabrication shall be in accordance with Specification Section 13252.
- Longitudinal welded joints shall not be located behind any plate or obstruction which prevents inspection of the weld. Circumferential welded joints shall clear internal support rings or other attachment welds by not less than 1 inch.
- C. The vessel nameplate shall be austenitic stainless steel. It shall be not less than 1/8 inch thick. The background shall be etched 0.01 inch. The nameplate shall be welded to a bracket which in turn is welded to the vessel. The bracket shall extend 2 inches beyond the outside of the vessel or insulation. The nameplate shall include the following information:
 - 1) Manufacturer's name and location (city and state)



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		2)	Manufacturer's serial number
		3)	Date built (month and year)
		4)	Maximum allowable working pressurepsigoF (coincident pressures and temperatures)
		5)	Minimum design metal temperature
		6)	Vessel equipment number
		7)	Vessel name
		8)	Vessel fabricated weight pounds (round up to 3 significant digits or to hundreds)
		9)	Project control number
	D.	Each	vessel shall be provided with two lifting lugs.
2.2.2	Weld [.]	ing	
	Α.		l and head joints shall be full-penetration, double butt- ed joints.
	В.	pene	les shall be welded to the shell and heads with full- tration groove welds unless specified otherwise on the ract Drawings.
	C.	Weld 0506	ing shall be in accordance with Specification Section 3.
2.2.3	Heat	Trea	tment
	Α.	mate the	Seller elects to perform heat treatment or heat the rial for forming above lower transformation temperature, following procedures and records shall be submitted for oval.
		1)	Heating temperature/time.
		2)	Holding temperature/time.
		3)	Cooling rate and temperature.
	В.		tional welding on vessels which have been postweld heat ted shall not be permitted.
	С.	Heat	ing in the range of 800°F to 1600°F shall be avoided.

2.2.4 Tolerances

Manufacturing tolerances shall be as shown in Attachment C of this specification section and in accordance with ASME Section VIII, Division 1 unless specified otherwise on the Contract Drawings.

2.2.5 Inspection and Tests

2.2.5.1 Nondestructive Examination (NDE)

- A. NDE methods and acceptance shall be in accordance with Specification Section 05063.
- B. The specific requirements for nondestructive examination shall be as shown by NDE symbols on Seller's drawings.
- C. When liquid penetrant inspection is specified, machining or grinding of the surface will not be allowed other than to remove excessive irregularities which would interfere with proper interpretation of results.

2.2.5.2 Pressure Tests

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- A. All vessels shall be hydrostatically tested at the hydrotest pressure specified on the Contract Drawings. The hydrotest procedure shall be in accordance with ASME Section VIII, Division 1, Paragraph UG-99(b). Test pressure shall be held for not less than one hour.
- B. Seller shall submit detailed pressure testing procedures for each vessel. These shall include the fluid to be used and method of determining its temperature and test pressure. No vessel shall be closed for pressure testing without Buyer approval.
- C. Additional welding on the vessel shall not be permitted after hydrostatic tests have been completed.

2.2.5.3 Shop Inspection

- A. Shop inspections of each pressure vessel not code stamped shall be made by Seller. Seller inspection personnel shall be qualified in accordance with ASME Section VIII, Paragraph UG-91(a). The references to the inspector in ASME Section VIII, Paragraph UG-90 shall also apply to Seller.
- B. The alternative inspections in accordance with ASME Section VIII, Paragraph UG-90(c-2) shall not be permitted.

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2.2.5.4 Labeling

- A. Electro-etching or vegetable dyes shall be used to provide identification marking of materials and parts in accordance both with ASME Section VIII, Division 1 and ASME Section II, Part A. Do not use marking inks or crayons that contain more than 35 ppm of halogens or more than 5 ppm of harmful metal or salts such as zinc, lead, molybdenum or vanadium oxides. These may cause corrosive attack when the vessel part is heated. A certified statement from the marking ink manufacturer that these chemical content limits have been met will be considered acceptable.
- B. Vessels shall be clearly identified by dye stenciling the equipment name and equipment number in accordance with the Contract Drawings.
- C. The center of gravity shall be marked on all vertical vessels. The letters "C.G." and shipping weights in tons (or tenths of tons, e.g., 1.8 tons) shall be painted at two locations diametrically opposite and adjacent to the "C.G." markings.
- D. The dye stencil marking and lettering shall be white.

PART 3 EXECUTION

(Not Used)

END OF SECTION

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ATTACHMENT A PRESSURE VESSEL MATERIAL RECORD

_					EQUIPMENT	NUMBER
.0	PRES	SSURE VESSEL SKETCH (PROVIDI	ATTACHMENT)			
2.0	PRI	MARY MATERIAL RECORD				
	The	following components shall !	e tabulated below:			
	(a)	PRESSURE COMPONENTS: Shell reinforcing pads.	courses, conical re	ducing sections, heads,	rolled plate nozzlo	e necks, nozzle
	(b)	NONPRESSURE COMPONENTS: Al and heads.	l items which are re	quired to be the same ma	aterial specificatio	on as shell courses
I	ГЕМ	DESCRIPTION	MATERIAL	MANUFACTURER	HEAT NO.	SLAB NO.
	-					

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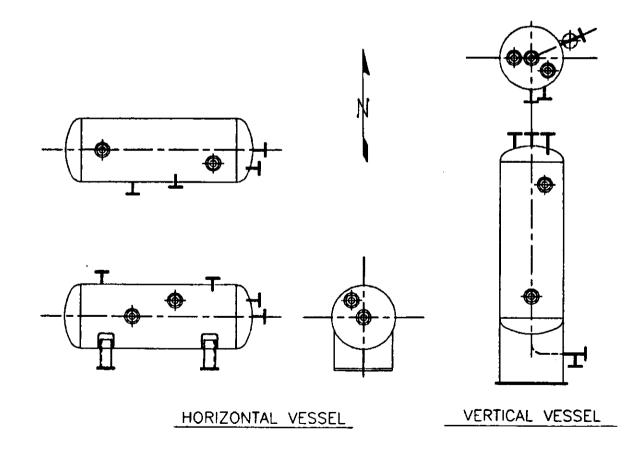
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		P.O. NUMBER
3.0	MATERIAL TEST REPORTS	EQUIPMENT NUMBER
	Provide a reproducible copy of Certification and the copy of Certi	fied Material Test Report for only those components tabulated in the primary
4.0	MISCELLANEOUS MATERIALS	
	Flanges:	Structural Shapes:
	Blind Flanges:	Other:
	Nozzle Pipe Necks:	
	Internal Piping:	
	Support Skirt/Saddle:	
	Wear Plate:	
	Welded Internal Supports:	
	Welded External Attachments:	
	Bolting (Internal):	
	Bolting (External):	
We d	certify that the materials as listed i	n this document were used in the construction of the subject pressure vessel.
		SIGNED DATE
		TITLE
		SELLER

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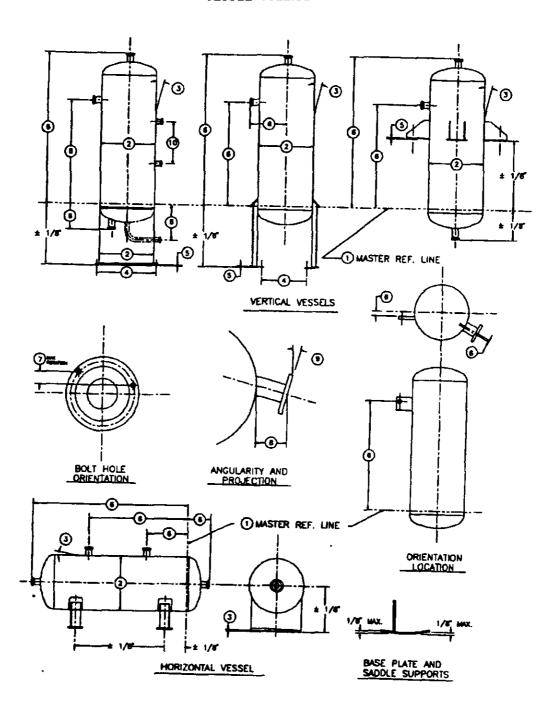
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ATTACHMENT B FLANGE BOLT HOLE ORIENTATION



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ATTACHMENT C VESSEL TOLERANCES



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The following notes are referenced to the numbered circles of Attachment C:

- The master reference line shall be established by the vessel manufacturer and clearly marked inside and outside of the shell prior to attaching the adjacent head. It shall be parallel to the root land of the shell course and perpendicular to the longitudinal axis of the vessel.
- Shell and Skirt Outside Circumference Tolerance:

OUTCIDE DIAMETED	SHELL OR SKIRT THICKNESS						
OUTSIDE DIAMETER	UP TO 2-1/2*	2-1/2* TO	4" OVER 4"				
LESS THAN 4'-O"	± 3/8"	± 1/2"					
OVER 4'-0" TO 8'-0"	± 1/2"	± 3/4"	± 1"				
OVER 8'-0" TO 15'-0"	± 3/4"	± 1"	± 1-1/2*				
OVER 15'-0"	± 1"	± 1-1/2"					

NOTE:

MATCHING SHELL AND HEAD SHALL BE SUBJECT TO CODE OFFSET TOLERANCE

- Shell and Skirt Tolerance: Max. slope from straight line is 1/8" in 10'-0" with total max. deviations as follows:
- The center of anchor bolt hole or pipe guide shall not deviate from the specified location on the bolt circle by more than the following:

TAN. TO TAN. LENGTH	TOTAL MAX. DEVIATION	VESSEL 1.D.	MAX. DEVIATION		
UP TO 50' TO 100'-0"	1/2*	4'-0 AND LESS	1/8*		
50'-0" TO 100'-0"	3/4"	OVER 4'-0" TO 8'-0"	3/16"		
100'-0" AND OVER	1"	OVER 8'-0"	1/4*		

5 Out of level slopes = 1/32" per foot with 1/4" max.

	6	Ø	8	9
NOZZLES	± 1/4"	± 1/16"	± 3/16"	1/2°
COUPLINGS	± 1/4"	**		
MANHOLE HANDHOLES	± 1/2*	± 1/2"	± 1/2"	1°
CLIPS	± 1/4"			

Max. deviation between any (2) coupled instrument connections = 1/16"

ATTACHMENT D CONTRACT DRAWINGS

DRAWING NUMBER	TITLE
Drawing H-2-120151	TK-540-014 Nitric Acid Decon Make-up Tank
Drawing H-2-120152	TK-540-017 Oxalic Acid Decon Feed Tank
Drawing H-2-120156	TK-210-001 Crane Decon Feed Tank (acid)
Drawing H-2-120157	TK-210-002 Crane Decon Feed Tank (caustic)
Drawing H-2-120161	TK-450-001 Process Cooling Expansion Tank
Drawing H-2-120162	TK-460-001 Melter Cooling Water Expansion Tank
Drawing H-2-120163	TK-480-001 Process Water Tank
Drawing H-2-120164	TK-520-001 Floor Drain Catch Tank
Drawing H-2-120165	TK-520-002 Regulated Drain Catch Tank
Drawing H-2-120166	TK-520-003 Acid Drain Catch Tank
Drawing H-2-120167	TK-520-004 Organic Acid Drain Catch Tank
Drawing H-2-120168	TK-520-005 Floor Drain Sampling Tank
Drawing H-2-120169	TK-540-002 Sugar Solution Feed Tank
Drawing H-2-120170	TK-540-004 Offgas Treatment Chemical Feed Tank
Drawing H-2-120171	TK-540-006 KOH/Frit Modifier Feed Tank
Drawing H-2-120172	TK-540-008 Formic Acid Feed Tank
Drawing H-2-120173	TK-540-012 50% Nitric Acid Feed Tank
Drawing H-2-120174	TK-540-019 Potassium Permanganate Feed Tank
Drawing H-2-120175	TK-540-021 Sodium Nitrite Feed Tank
Drawing H-2-120176	TK-540-023 50% Caustic Feed Tank
Drawing H-2-120177	TK-540-024 Flush Water Feed Tank
Drawing H-2-120178	TK-540-027 Diatomaceous Earth Slurry Feed Tank
Drawing H-2-120179	TK-540-029 Zeolite Slurry Feed Tank
Drawing H-2-120180	TK-540-031 Dilute Sodium Hydroxide Feed Tank
Drawing H-2-120181	TK-580-002 Process Frit Slurry Feed Tank
Drawing H-2-120182	TK-580-003 Decon Frit Slurry Feed Tank
Drawing H-2-120442	TK-540-034 Antifoam Feed Tank

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SECTION 14583 COLD FEED AGITATORS B-595-P-P33B-14583

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE $2-2-93$	WAPA YES NO _X QUALITY LEVEL I II _X SAFETY CLASS 1 2 3 <u>X</u> 4_
ORIGINATOR:	CHECKER:
F. Bizjak, Mechanical Engineer Date	D. A. Buzzelli, tead Disc. Checker Date
APPROVED BY:	
R. B. Exickso C. J. Divona Lead Discipline	<u>1-26-93</u> Engineer Date

U.S. DEPARTMENT OF ENERGY

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC.
Advanced Technology Division
Fluor Contract 8457

Rev. 0

SECTION 14583 COLD FEED AGITATORS B-595-P-P33B-14583

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SECTION 14583 COLD FEED AGITATORS

PART 1 GENERAL

1.1 SUMMARY

This specification section covers the design, materials, fabrication, quality, inspection, testing and delivery requirements of agitators for use in non-radioactive slurries and chemicals. The requirements outlined herein supplement the agitator data sheets (Attachment A).

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) and/or AMERICAN GEAR MANUFACTURERS INSTITUTE (AGMA)

ANSI/AGMA 6000

1988 (Rev. A) Specification for

Measurement of Linear Vibration on Gear

Units

ANSI/AGMA 6010

1988 Standard for Spur, Helical,

Herringbone and Bevel Enclosed Drives

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

and/or

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ANSI/ASME B16.5

1988 Pipe Flanges and Flanged Fittings

ANSI/ASME B46.1

1985 Surface Texture (Surface Roughness,

Waviness, and Lay)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A182/A182M

1 '

1991 Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-

Temperature Service

ASTM A240

1991 (Rev. A) Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Processor Mossels

Strip for Pressure Vessels

ASTM A312/A312M

1991 (Rev. B) Standard Specification for

Seamless and Welded Austenitic Stainless

Steel Pipe

ASTM A479/A479M

1991 (Rev. A) Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes for Use in Boilers and Other

Pressure Vessels

ASTM A744/A744M

1991 Standard Specification for Castings, Iron-Chromium Nickel, Corrosion Resistant,

for Severe Service

ANTI-FRICTION BEARING MANUFACTURERS ASSOCIATION (AFBMA)

AFBMA 9

1990 Load Ratings and Fatigue Life for

Ball Bearings

AFBMA 11

1990 Load Ratings and Fatigue Life for

Roller Bearings

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA Standard

1978 Guards for Rotating

Instruction 1-12.14

Equipment

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-6

1989 Surface Preparation Specification

No. 6, Commercial Blast Cleaning

SSPC SP-10

1989 Surface Preparation Specification

No. 10, Near-White Blast Cleaning

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

Specification Section 05066 Welding Specialty Equipment

Specification Section 13252 Precaution for the Fabrication,

Handling and Storage of Stainless

Steel and Nickel Alloys

Specification Section 15196

Identification and Tagging Methods

for Mechanical Equipment

Specification Section 16150

1 .

Motors - Induction for General

Service

9413202.0613

1.4 DEFINITIONS

CMTR - Certified Material Test Report

FAT - Factory Acceptance Test
NDE - Nondestructive Examination
PT - Liquid Penetrant Examination

RPM - Revolutions per Minute

TEFC - Totally Enclosed Fan Cooled

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

- 1.6.1 Assembly and outline drawings of the equipment shall be submitted for Buyer approval. The following information shall be included on or submitted with the drawings:
 - A. Two views of the agitator assembly (plan and elevation).
 - B. Cross section of drive assembly. Cross section shall show shaft diameter and bearing spans.
 - C. Mechanical seal or stuffing box assembly.
 - D. Complete specification, designation and Certified Material Test Reports (CMTRs) of all materials.
 - E. Weight of agitator assembly. This shall include the driver, mounting plate and lifting assembly weights. All loads (torque, bending moments) imposed on the vessel nozzle shall be shown. Weights of separate removable parts shall be shown if agitators cannot be removed as a complete assembly. Weights of agitator assembly components (electric motor, reduction gear box and agitator shaft and impeller) shall be shown on the drawings.
 - F. Dimensions. These shall include height, width, maintenance space required, service connection locations, mounting details, mounting flange details, lifting assemblies and other pertinent dimensions with reference to the datum plane (bottom of mounting plate).
 - G. Buyer purchase order and item numbers.
 - H. Bill of materials.

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- 1.6.2 Instructions for operation, maintenance and storage shall be submitted for Buyer review. These instructions shall incorporate theory of operation, operational adjustments, troubleshooting, instructions for assembly and disassembly and complete parts list with part numbers. Site storage instructions shall include requirements for handling, short-term and long-term storage. Data shall be submitted in accordance with Specification Section 01730. Complete installation manuals shall also be submitted.
- 1.6.3 A list of recommended spare parts for one (1) year's routine operation shall be supplied. The spare parts list shall include sufficient data to permit procurement of standard parts from the original manufacturer or any sub-supplier. Seller shall provide a sectional view of the identified parts.
- 1.6.4 Completed agitator data sheets (Attachment A). Electric motor data sheets (Attachment A) of Specification Section 16150 shall be completed and submitted.
- 1.6.5 Design Calculations

An engineering design analysis shall be provided. The analysis shall contain supporting calculations used to establish horsepower requirements, shaft sizes, bearing loads, nozzle loads, operational characteristics and technical descriptions. Calculations shall be complete and in sufficient detail to permit second party review. Seller shall establish and guarantee the forces and moments on the agitator nozzle. Lifting eye calculations shall be included.

- 1.6.6 Certified Factory Acceptance Test (FAT) procedures, inspection and quality assurance control plan in accordance with Paragraph 2.5.
- 1.6.7 Certified performance FAT results prior to shipment in accordance with Paragraph 2.5.
- 1.6.8 Lubrication requirements in accordance with Paragraph 2.2.4.
- 1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

- 1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS
- 1.8.1 Climatic and Geographic Site Conditions
 - A. Site Elevation 714 feet above sea level
 - B. Barometric Pressure 14.3 psia
 - C. Outside Design Temperature
 - 1) Maximum Design Temperature 110°F

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2)	Minimum	Design	Temperature	-20°F
-,		200.3	. cmpc. aca. c	

3) Wet Bulb Design Temperature 68°F

1.8.2 Operating Environment

Α. Normal Temperature 60°F to 104°F

В. Maximum Temperature 104°F

С. Relative Humidity Not Controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Materials

- 2.1.1.1 All pipe, fittings, plate, bar, castings and forgings shall be in accordance with ASTM A182/A182M, ASTM A240, ASTM A312/A312M, ASTM A479/A479M and ASTM A744/A744M as applicable. Wet-end components and those components likely to be exposed to vapors of chemicals being handled shall be stainless steel. These include impeller, shaft, outboard bearing, shaft seal housing and mounting flange facing. Type of stainless steel to be used for wetted parts shall be in accordance with agitator data sheets (Attachment A).
 - Α. Seller may utilize standard materials of construction on internal gear reducer, motor, bearing and coupling components. Exterior surfaces of the above components may also be Seller's standard materials of construction.
 - В. All other components shall be Seller's standard materials of construction.
- 2.1.1.2 Design envelopes and model numbers for each agitator are referenced in Attachment B.

2.2 **FABRICATION AND MANUFACTURE**

- 2.2.1 General Requirements
- 2.2.1.1 Agitators shall provide mixing of components shown on the agitator data sheets (Attachment A) with respect to class and degree of agitation.
- 2.2.1.2 The equipment shall be designed for mounting on the type of vessel as stated on the agitator data sheets (Attachment A).

- 2.2.1.3 The equipment shall have a design life of not less than 20 years at the specified conditions. This requirement excludes expendable items such as impellers, bearings, seals and gaskets.
- 2.2.1.4 The agitators will be used for chemical agitation in a nuclear waste processing facility. They shall not, however, be exposed to radiation.
- 2.2.1.5 The agitator shall be Seller's standard low-risk design, modified as required to be in accordance with this specification section.
- 2.2.1.6 The equipment shall be of proven design with a minimum of two years of successful operation in equal or more severe design and operating conditions as outlined in the agitator specification section.
- 2.2.1.7 Seller shall follow the requirements of Specification Section 13252 both prior to and after welding to minimize contamination of stainless steel.
- 2.2.2 Technical Requirements
- 2.2.2.1 Bearings shall be of the sealed anti-friction type. They shall be in accordance either with AFBMA 9 or AFBMA 11. Bearing L-10 life shall be not less than 40,000 hours. Agitators in frit slurry service shall be designed for start-up torques at least double the expected running torque and bearing L-10 life of 100,000 hours. Bearings shall be fitted with zerk fittings and purge parts.
- 2.2.2.2 Agitators shall be single speed, top entering and flange mounted on closed tanks. Agitators shall be provided with single mechanical seals or stuffing boxes as required on agitator data sheets (Attachment A). Direction of agitator shaft rotation shall be clockwise looking downward.
- 2.2.2.3 A service factor of not less than 1.5 shall be used in accordance with ANSI/AGMA 6010, Appendix A, Table A-3, unless otherwise specified on the agitator data sheets (Attachment A). A "Uniform" load classification shall be used. All gear drives shall be either helical or herringbone type in accordance with ANSI/AGMA 6010. AGMA gear quality class shall be 10 or better. Mechanical rating shall be not less than 1.5 times the nameplate motor horsepower. Thermal horsepower shall be not less than the nameplate motor horsepower. The mixer blade tip speed for agitators in frit slurry service shall be limited to 800 ft/min.
- 2.2.2.4 Shafts shall be sized to withstand forces resulting from starting at maximum tank level and operating in an empty tank. Impeller thrust in the fluid shall be downward and shaft thrust shall be upward in all cases where the impeller is designed to provide axial thrust. Bottom steady bearings shall not be provided. The

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> agitator shaft may be hollow. The shaft's calculated maximum combined shear stress shall be less than 20% of the construction material's tensile yield strength. Mixer shafts shall be straight

to within 0.003 in./foot.

The first critical speed shall be not less than 135 percent of the 2.2.2.5 maximum operating speed.

- All assembly joints shall include alignment or centering fits as 2.2.2.6 required to ensure accurate reassembly of all parts. Shaft and impeller assembly may either be bolted or welded construction. Bolted assemblies shall be secured to prevent impeller blade unbolting. The impeller shaft assembly shall be statically balanced as follows:
 - Α. Impeller shaft speed up to 125 rpm inclusive to 0.5 ounceinch per pound of rotating weight.
 - Impeller shaft speed from 125-350 rpm to 0.25 ounce-inch per В. pound of rotating weight.
- The vibration limits shall be in accordance with ANSI/AGMA 6000. 2.2.2.7
- 2.2.2.8 Pressure-containing components shall be suitable for the design pressure and temperature of the mixing vessel. This requirement includes mounting flanges. Flanges shall be in accordance with ANSI/ASME B16.5. Flange size and rating shall be as specified on the agitator data sheets (Attachment A). Mounting flanges facing shall have a surface finish of 125 RMS in accordance with ANSI/ASME B46.1.
- 2.2.2.9 Seller shall provide a flexible, forged steel coupling between the power drive and the agitator gear drive. Motor to reducer input coupling shall have a service factor of not less than 2.0 based on motor capacity. Inside tank coupling is required when specified on the agitator data sheets (Attachment A). Coupling materials shall be compatible with shaft materials.
- Couplings shall be keyed in both shafts. The coupling design 2.2.2.10 shall allow removal of the hub without the need for heating. All exposed rotating parts shall be provided with heavy-duty guards in accordance with OSHA Standard Instruction 1-12.14. Guards shall be removable.
- 2.2.2.11 The agitator design shall include provisions for ensuring that drive and agitator components are aligned during assembly.

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- The design shall be such that bearings, seals, driver and gear 2.2.2.12 units may be replaced without dismantling other major parts. It shall also be possible to replace these parts without emptying or depressuring the vessel.
- 2.2.3 Shaft Seal

The shaft seal type shall be as specified on the agitator data sheets (Attachment A). Seal parts shall be inert both to the fluids being mixed and to any lubricant used. Nonmetallic components are included in this requirement. The use of any pressurized external lubrication system shall not be acceptable.

- 2.2.3.1 Stuffing boxes shall include the following minimum design characteristics:
 - Α. They shall be an integral part of the cover.
 - В. Seal cage design shall allow easy removal.
 - С. They shall have not less than 3 rings of packing plus the seal cage.
 - D. The design shall allow space to permit packing replacement without removing or dismantling any part other than the gland and seal cage.
- 2.2.4 Lubrication Requirements

Seller shall submit the lubrication requirements for the agitator on Seller's lubrication data sheet. Lubricants shall be recommended by Seller. Lubricants shall be able to be drained and replenished. A synthetic gear lubricant is preferred.

- 2.2.5 **Electric Motors**
- 2.2.5.1 Seller shall provide each agitator with a totally-enclosed fancooled (TEFC), chemical-type motor in accordance with Specification Section 16150. Seller shall complete electric motor data sheets from Specification Section 16150 (Attachment A) for each agitator. Drive motors shall be vertical.
- 2.2.5.2 The motor thrust bearing shall have a minimum rating of 120 percent of the maximum axial thrust load that can be transmitted to the bearing.
- Motors shall be single-speed. It is intended that the motor be 2.2.5.3 the weakest link in a high-torque event and that the shaft, impeller blades, etc. do not fail in any such event.
- 2.2.5.4 Motors shall be suitable for continuous duty.

2.2.6 Welding

Welding shall be in accordance with Specification Section 05066.

- 2.2.7 Painting
- 2.2.7.1 Stainless steel and nickel-based alloy construction materials shall not be painted. All carbon steel exposed surfaces shall be shop-primed and finish-painted in accordance with Seller's standards.
- 2.2.7.2 All machinery and equipment shall have a clean and finished appearance when delivered to Buyer. Prior to painting all surfaces shall be free of dirt, rust, grease, weld spatter, loose mill scale or other deleterious substances. Surfaces to be painted shall be cleaned in accordance either with SSPC SP-6 or SSPC SP-10 in accordance with Seller's surface preparation procedure. The paint type and quality shall be Seller's standard. It shall be applied in accordance with the paint manufacturer's recommended procedures. Colors will be advised by Buyer.
- 2.2.8 Noise

The noise level shall not exceed 85 dBA at 3 feet periphery around the agitator mounting flange.

2.2.9 Performance

Seller shall guarantee that the agitator is in accordance with all specified operating conditions and satisfactory application in all respects to the conditions described both in this specification section and the agitator data sheets (Attachment A).

- 2.2.10 Lifting Eyes
- 2.2.10.1 Lifting eyes shall be furnished for crane handling. These shall be positioned to give maximum balance with an even weight distribution to minimize handling hazards. Each lifting eye shall be designed to carry twice the lifting load. Agitator lifting assemblies shall be designed and fabricated with two lifting eyes.
- 2.3 OPERATING AND DESIGN CONDITIONS
- 2.3.1 Operating Conditions
- 2.3.1.1 Agitators will operate in various applications. These include blending of clear liquids to full solids suspension of thick slurries. Refer to the agitator data sheets (Attachment A) for each application.

2.3.2 Design Conditions

Agitators shall be designed to operate in process tanks under design conditions stated in the agitator data sheets (Attachment A).

2.4 LABELING

31722.6

Labeling shall be in accordance with Specification Section 15196. This shall be in addition to the manufacturer's identification plate. The nameplates shall be stamped or embossed with not less than the following information:

Purchase order number
Equipment number
Manufacturer's model number
Rated horsepower
Impeller diameter
Impeller RPM
Materials of construction of wetted parts

The nameplate shall be completely visible after assembly of the equipment.

2.5 TESTING AND INSPECTION

2.5.1 General

- 2.5.1.1 Seller shall supply Buyer with all certified test data whether witnessed or not. Agitators shall not be shipped until Buyer has reviewed test data. All equipment shall be completely shopassembled. Locating dimensions of mounting bolt holes shall be verified.
 - A. Agitators shall be no-load tested for 15 minutes or until oil temperatures have stabilized. Agitators shall then be tested complete with agitator shafts in accordance with test procedure to be submitted for Buyer approval. The test medium shall be water.
 - B. Seller shall provide test procedures that demonstrate the performance characteristics of the agitator (i.e., efficiency, mixing characteristics, horsepower needed, maximum volume capability for mixing designated liquid or slurry as specified in data sheets (Attachment A). Test procedures shall be approved by Buyer before use.
 - C. Seller shall provide certified results and reports for all FATs performed.

- Vibration tests of complete assembly shall be performed in D. accordance with ANSI/AGMA 6000.
- 2.5.1.2 Seller shall furnish copies of their inspection and quality control plan to Buyer.
- 2.5.1.3 Materials and workmanship shall be subject to inspection by Buyer. Inspection shall take place in Seller's shop.
- 2.5.1.4 At minimum the Buyer's inspector shall check equipment components, tagging, critical installation dimensions, connection sizes, connection locations and quality of workmanship against certified drawings, data and purchase order documents.
- 2.5.1.5 Preparation for shipment shall be subject to inspection.
- Nondestructive Examination General 2.5.2
- Nondestructive examination (NDE) acceptance criteria of welds 2.5.2.1 shall be in accordance both with Specification Section 05066 and this specification section.
- 2.5.2.2 All welds shall be 100% radiographically examined. Where it is not physically possible to perform radiographic examination welds shall be examined by liquid penetrant examination (PT). Where it is not physically possible to radiograph lifting eye welds, 100% of the root and final weld passes shall be PT examined.
- 2.5.3 Final Dimensional Checks

After fabrication and testing Seller shall verify measurements by means of as-built dimension drawings. The procedure selected for final dimensional check shall be submitted for Buyer review. Buyer may witness Seller's dimensional verification measurements at Buyer's option. Seller shall provide proof that the agitators and agitator appurtenances are dimensionally correct within the specified tolerances in accordance with this specification section.

2.6 **PACKAGING**

Preparation for shipment and packing may conform to the Seller's standards. At minimum, the packaging shall provide protection against corrosion and damage from normal handling and storage. Minimum preparation shall include the requirements listed below.

Machined surfaces, threads, bearings and bearing housings Α. shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.

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- B. Threaded connections and tapped holes shall be capped or plugged. Compatible materials shall be used to prevent thread damage.
- C. The agitator motor shall be fully protected against moisture penetration to the electrical compartments and winding.
- D. Mechanical seals and other sealing devices shall be installed for shipment.
- E. Bracing, supports and rigging connections shall be provided to prevent damage during shipment, lifting and unloading. Lifting points shall be clearly marked.
- F. Separate or loose parts shall be completely boxed and attached to the main item to be shipped as a unit. All shipping boxes shall be identified by the Seller's order number, equipment number and equipment description.

PART 3 EXECUTION

(Not Used)

END OF SECTION

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AGITA	ATOR	 		ORIG BY	CHKD	APPR'D
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SERVICE	BO	OR DRAIN CATCH TANK	AGITATION (TK 520,001)			
			G TOP ENTER	Y STRA SATE	OWN	
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MATERIA	LS TO BE MIXED	BATCH	Z COM			
COMPONENT	QUANTITY - LBS	VISCOSITY - Cp	SP GRAVITY	·F		SIG
CASE 1. WASTE WATER	20400	0.98	0.9980	77	~).1
0405.0 500 4000000						
CASE 2. 50% wt SODIUM	31000	85	1.52	77	4).1
HYDROXIDE SOLUTION			****			
(ACCIDENT)						
FINAL MIX (NOT APPLICABLE)			,		<u> </u>	
CLASS OF AGITATION: BLE			SUSPEND SOLIDS	HEAT EXCHANGE] EMULSI	FY 🔲
		ZE PRIOR TO SAMPLING	<u> </u>	FOAMING	YES 🔲 H	10 X
DEGREE OF AGITATION: MILE	D 🔲 MEDIUM 🗵	VIOLENT 🔲				
TOO MUCH AGITATION WILL			· · · · · · · · · · · · · · · · · · ·			
TOO LITTLE AGITATION WILL _						
IF BATCH, LARGEST OR LEVEL				SMALLEST _1250 GAL	LONS	
MIXER SHALL BE DESIGNED TO)	2500 GALLONS		IN		_ MINUTES
MIXER WILL X WILL NOT	BE OPERATED WHIL	E FILLING OR DRAWING	OFF			
			VERTICAL X API	TANK		
SIZE:	.D. * X	8'-6' STRAIGHT	T SIDE OR			LENGTH *
BOTTOM TYPE:		ANGED AND DISHED				CENTON
TOP TYPE:	137		1		L	
MIXER MOUNTING F		ANGED AND DISHED L		ANS! 150# RF		
	R MOUNTING FLANGE	,				
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	_					
BAFFLES: NO		IN LENG	TH	IN VERTICAL X	HORIZONT	AL 🗀 📙
MIXER: MOTOR DRIVE:	AC X DC EX	P PROOF L TEFC L	X D.P			
		60 CYCLE				
SHAFT SEAL: MECHANICAL						
SIZE OPENING FOR IMPELLER II		14°				
HEAD ROOM ABOVE VESSEL FO						
MATERIALS OF CONSTRUCTION	WETTED PARTS	3041_53	<u> </u>			
MINIMUM AGMA SERVICE FACTO	OR FOR GEAR REDUCER		MII	IIMUM BEARING LIFE (L-1	0)	
		DATA BY VE	NDOR			
MIXER MODEL NO.						-
DRIVE: HORSEPOW	/ER RPM _					MFGR
GEAR: RATIO	AGMA	rating	OUTPUT RPM			MFGR
SHAFT COUPLING: DESCR	IBE					
	IBE		······································			
	IBE		 			
SHAFT:OD*		ENGTH FROM MOUNTING				
IMPELLERTYP	EOD	NO. BL	ADES	REMOVABLE FROM SHAI	FT YES] No [
ADDITIONAL DATA						
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				HBJO	SSL	
SERVICE	ACIE	DRAIN CATCH TANK A	GITATOR (TK-520-003)			
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	·		··········			
COMPONENT	QUANTITY - LBS	MSCOSITY - Cp	SP GRAVITY	NUOUS 🗀 😽		PSIG
CASE 1. TYPICALLY WASTE	3750	0.98	0.9980	70	+	-0.1
WATER (POSSIBLY ACIDIC)					 	
			····			
CASE 2. 50 W/% NITRIC ACID	4880	1.90	1.31	70		-0.1
FINAL MIX (NOT APPLICABLE)						
CLASS OF AGITATION: BLEN	D X DISSOLVE	DISPENSE GAS 🔲	SUSPEND SOLIDS	HEAT EXCHANGE		SIFY 🔲
OTHE	R HOMOGENE	ZE PRIOR TO SAMPLIN	<u> </u>	FOAMING	YES 🔲	NO 🔯
DEGREE OF AGITATION: MILD	MEDIUM X	VIOLENT 🗀				
TOO MUCH AGITATION WILL						
TOO LITTLE AGITATION WILL						
IF BATCH, LARGEST OR LEVEL B				SMALLEST3	6 GALLON	\$
MIXER SHALL BE DESIGNED TO		950 GALLONS		IN		MINUTES
MIXER WILL X WILL NOT	BE OPERATED WHIL	E FILLING OR DRAWING	OFF			
VESSEL: OPEN TO	OP CLOSED TO	P X HORIZ	VERTICAL X API	TANK		
SIZE: 5'-0'	I.D. " X	6'-6' STRAIGH	T SIDE OR			LENGTH '
BOTTOM TYPE:	FLAT FL	ANGED AND DISHED 🗀	2:1 SEMI-ELLIP	TICAL X CONE		
TOP TYPE:		ANGED AND DISHED				
MIXER MOUNTING FL		ZE	RATING	ANSI 150# RF		
•	MOUNTING FLANGE					
i	PS			RATURE		
BAFFLES: NO	width	IN LEN	зтн	IN VERTICAL X	HORIZON	ITAL 🔲
		P PROOF 🔲 TEFC				
		CYCLE				
SHAFT SEAL: MECHANICAL D					··	
SIZE OPENING FOR IMPELLER IN		"				
HEAD ROOM ABOVE VESSEL FOR			-			
MATERIALS OF CONSTRUCTION						
MINIMUM AGMA SERVICE FACTO	R FOR GEAR REDUCER .		MI	NIMUM BEARING LIFE (L-	10)	
		DATA BY VE	NDOR			
MIXER MODEL NO		· 				
DRIVE: HORSEPOWE						
GEAR: RATIO SHAFT COUPLING: DESCRIE						MFGR
MECHANICAL SEAL: DESCRIE						
	BE					
1		NGTH FROM MOUNTING	FLANGE, INCHES			
IMPELLERTYPE				REMOVABLE FROM SHA	ET VEC	п "п
ADDITIONAL DATA				NEMOVABLE PROM STA	AFI TES	L NOL
		BEMAR	KS			
						
105\OS\101\204\84572014.005/WP51/12	5933:19pm					ON 3
	area. I april			IMPACT LEVE		

		ATTACHMEN	<u> </u>			
T FLUOR DANIEL		NO. BY	REVISION	SHEET NO.	1	REV.
				DATE P33E	TCONTR	O
DATA SH	EET		_ 	03-20-	en l	45734
U.S. Department of I Hanford Waste Vitrifi	Energy			TAG NO.	<u> </u>	7.07.07
Hanford Waste Vitrifi Richland, Washingto	ication Plant				AG-520-003	
DOE Contract DE-A	C06-86RL10838			SPECIFICATIO		
AGITAT	OR			ORIG BY	14583	APPR'D
		\triangle		HBJO	SSL	
	OPCANIC A	CID DRAIN CATCH TAN	Y AGITATOR (DY 520 O			
NO. UNITS		SIDE ENTERING			RING	
						
COMPONENT	QUANTITY - LBS	BATCH VISCOSITY - Cp	SP GRAVITY	uous 🗆 📙	PS	IG.
CASE 1. TYPICALLY WASTE	8550	0.96	0.9980	70	-0.	
WATER (POSSIBLY ACIDIC)						_
CASE O ON THE FORMER ACID	10050	1.5	1.2	70		
CASE 2. 90 W/% FORMIC ACID	10250	1.85		70	-0.	.7
CLASS OF AGITATION: BLEND	DX DISSOLVE	DISPENSE CAS T	SUSPEND SOLIDS	HEAT EXCHANGE]	<u>, </u>
OTHER	******	PRIOR TO SAMPLING	SUSPEND SULIDS		YES N	
DEGREE OF AGITATION: MILD		VIOLENT 🗀			,	_
TOO MUCH AGITATION WILL	CAUSE	EXCESSIVE SPLASHING				
TOO LITTLE AGITATION WILL			ED PARTICULATES			
IF BATCH, LARGEST OR LEVEL BAT				SMALLEST	5 GALLONS	MINUTES
MIXER SHALL BE DESIGNED TO		025 GALLONS		IN		_ MINUIES
MIXER WILL X WILL NOT .						
VESSEL: OPEN TOP	CLOSED TOP	HORIZ L	VERTICAL X API	TANK L		LENGTH '
]		IGED AND DISHED	2:1 SEMI-ELLIPT	ICAL X CONE		
		IGED AND DISHED	2:1 SEMI-ELLIPT	_	_	
MIXER MOUNTING FLAI		12	RATING			
	OUNTING FLANGE					
	PSIG		DESIGN TEMPE			<u>150</u> °F
		IN LENGT		IN VERTICAL X	HORIZONTA	.L 🔲
		PROOF TEFC X	VOLTS			
	<u></u>	<u></u>				
SHAFT SEAL: MECHANICAL X		LUBRICATION			-	
HEAD ROOM ABOVE VESSEL FOR I	_					
MATERIALS OF CONSTRUCTION WE	ETTED PARTS	304L SS		<u>-</u>		
MINIMUM AGMA SERVICE FACTOR	FOR GEAR REDUCER		MIN	IMUM BEARING LIFE (L-	0)	
		DATA BY VEN	IDOR			
MIXER MODEL NO.						
DRIVE: HORSEPOWER						MFGR
	AGMA RA	TING	OUTPUT RPM			_ MFGR
STUFFING BOX: DESCRIBE				 		
SHAFT:OD" _	LEN	GTH FROM MOUNTING FL	ANGE, INCHES			
IMPELLER TYPE ADDITIONAL DATA	OD"	NO. BLAI	DES	REMOVABLE FROM SHA	FT YES] NO 🗆
ADDITIONAL DATA		REMARK	3			
105\OS\101\204\84572015.006/WP51/1258	33:22pm			SAFETY CL	ASSIFICATION	_3_

		ALIACHME	ENIA		
T FLUOR DANIEL	_	NO. BY	REVISION	SHEET NO.	REV.
	•				I-DS-4 0
DATA !	SHEET	 		DATE	CONTRACT
				03-20-9	0 845734
U.S. Department of Hanford Waste Vi	of Energy			TAG NO.	
Richland, Washing	aton	 			AG-520-004
DOE Contract DE	-AC06-86RL10838			SPECIFICATION	
ACIT	ATOR	\square		ORIG BY	14583 CHK'D APPR'D
ACIT	AIUR				1
			 	HBJO	SSL
SERVICE	FLOOR	DRAIN SAMPLING TAN	K AGITATOR (TK-520-00)	5)	
NO. UNITS1					PING

	ALS TO BE MIXED	BATCH	СОМП	MUOUS 🗆	
COMPONENT	QUANTITY - LBS	VISCOSITY - Cp	SP GRAVITY	4	PSIG
CASE 1. WASTE WATER	20400	0.98	0.9980	77	-0.1
			<u> </u>	<u> </u>	
CASE 2. 50% wt SODIUM	31000	85	1.52	77	-0.1
HYDROXIDE SOLUTION	<u> </u>			ļ	
(ACCIDENT CASE)					
FINAL MIX (NOT APPLICABLE)			<u>_</u>		
			SUSPEND SOLIDS	HEAT EXCHANGE	
отн	IER <u>HOMOGENIZE PRIC</u>	DR TO SAMPLING		FOAMING	YES 🔲 NO 🗓
DEGREE OF AGITATION: MILE TOO MUCH AGITATION WILL TOO LITTLE AGITATION WILL	O MEDIUM 🔼	VIOLENT			
TOO MUCH AGITATION WILL _		RESULT IN SPI	LASHING		
IF BATCH, LARGEST OR LEVEL I					
MIXER SHALL BE DESIGNED TO	,	2500 GALL	<u>,ons</u>	IN <u>10</u>	MINUTE
MIXER WILL XX WILL NOT	BE OPERATED WHI	LE FILLING OR DRAWING	OFF		
VESSEL: OPEN	TOP CLOSED TO	OP X HORIZ	VERTICAL X API	TANK	
	I.D. * X				LENGTH
BOTTOM TYPE:	FLAT FL	ANGED AND DISHED] 2:1 SEMHELLIP	TICAL X CONE	
TOP TYPE:		ANGED AND DISHED	2:1 SEMI-ELLIP	TICAL 🗀	
MIXER MOUNTING F		ZE <u>14°</u>		ANSI 150# RF	
LOCATION AGITATO	OR MOUNTING FLANGE _				
DESIGN PRESSURE	PS	JIG .	DESIGN TEMPE	ERATURE	150 ·
BAFFLES: NO 4	width	IN LEN	GTH	_ IN VERTICAL X	HORIZONTAL
MIXER: MOTOR DRIVE:	AC X DC EX	(P PROOF TEFC	X np	a III VEIIII III	HOBIZONIAL
3	_ PHASE60	CYCLE	460 VOLTS		
SHAFT SEAL: MECHANICAL	PACKING TY	PF LURRICATION		<u></u>	
SIZE OPENING FOR IMPELLER		14º			
HEAD ROOM ABOVE VESSEL FO	OR INSTALLING MIXER				
MATERIALS OF CONSTRUCTION	WETTED PARTS	304L S	s		
MINIMUM AGMA SERVICE FACTO				INIMUM BEARING LIFE (L-10	0)
		DATA BY VE	···		
MIXER MODEL NO.		W/11/1 72	_110011		
DRIVE: HORSEPOW					MFGF
GEAR: RATIO			•		
	RIBE	AATING			MFGF
	RIBE			<u> </u>	······································
	RIBE				
SHAFT:OD"					
IMPELLER TYP	EOD	NO. BI	ADES	REMOVABLE FROM SHAP	FT YES NO 🗆
ADDITIONAL DATA					
		REMAR	KS		***
					
				- <u> </u>	
	***:			SAFETY CL	ASSIFICATION3_
105\OS\101\204\84572016.007/WP51/1	25933:24pm			IMPACT LE	AVEL

		ALIACHMEN	NI A						
FLUOR DANIEL		NO. BY DATE	REVISION	SHEET NO.		REV.			
			· · · · · · · · · · · · · · · · · · ·		3-DS-5	0			
DATA SH	EET			DATE	СОИП	RACT			
U.S. Department of	Enerov			7AG NO.	90	845734			
U.S. Department of Hanford Waste Vitrif	ication Plant			1.70	40 500 005				
Richland, Washington DOE Contract DE-A	One sent topas			SPECIFICATIO	AG-520-005 N SECT NO.	1			
1					14583				
AGITAT	OR			ORIG BY	CHKD	APPR'D			
				HBJO	SSL				
SERVICE	REGULATE	D DRAINS CATCH TANK	ACITATION (TV ESS AS		-				
		SIDE ENTERING							
	·	· · · · · · · · · · · · · · · · · · ·		NG _A SIM ENTE					
	TO BE MIXED	BATCH 2		uous 🗌					
COMPONENT WASTE WATER	QUANTITY - LBS	VISCOSITY - Cp	8P GRAVITY 0.9980	ę ę	PS				
	0700	V.50	0.8960	70	-0	.1			
	l	·				 			
					 				
FINAL MIX									
CLASS OF AGITATION: BLEND	DISSOLVE -	DISPENSE GAS	SUSPEND SOLIDS	HEAT EXCHANGE	T EMILI SIE	~ 🗆			
OTHER				FOAMING	YES N	. X			
DEGREE OF AGITATION: MILD	MEDIUM X	VIOLENT 🔲							
TOO MUCH AGITATION WILL	CAUSE	EXCESSIVE SPLASHING							
TOO LITTLE AGITATION WILL			ED PARTICULATES						
IF BATCH, LARGEST OR LEVEL BAT				SMALLEST					
MIXER SHALL BE DESIGNED TOHOMOGENIZE 890 GALLONS IN 10 MINUTES									
MIXER WILL XX WILL NOT	BE OPERATED WHILE	FILLING OR DRAWING OF	F						
VESSEL: OPEN TOP		HORIZ STRAIGHT S		TANK 🗀					
SIZE:	I.D. " X <u>8</u> -	STRAIGHT S	SIDE OR			LENGTH *			
BOTTOM TYPE: FL	AT 🔲 FLAN	GED AND DISHED	2:1 SEMI-ELLIPT	ICAL X CONE		,			
TOP TYPE: FL		GED AND DISHED	2:1 SEMI-ELLIPT	ICAL					
MIXER MOUNTING FLAN		12"	RATING	ANSI 150# RF					
	OUNTING FLANGE	TOP							
DESIGN PRESSURE			DESIGN TEMPER	-		<u>150</u> °F			
		IN LENGTI		IN VERTICAL X	HORIZONTA				
		PROOF TEFC X							
		CACTE							
SHAFT SEAL: MECHANICAL X SIZE OPENING FOR IMPELLER INST.	PACKING L TYPE	LUBRICATION							
HEAD ROOM ABOVE VESSEL FOR IN									
MATERIALS OF CONSTRUCTION WE		2041 55		·					
MINIMUM AGMA SERVICE FACTOR F									
The state of the s	ON GERNALDOGEN			IMUM BEARING LIFE (L-1	0)				
MINER MODEL NO		DATA BY VEN	DOR	···					
MIXER MODEL NO DRIVE: HORSEPOWER	DDM	-							
GEAR: RATIO						MFGR			
						_ MFGR			
MECHANICAL SEAL: DESCRIBE									
									
		TH FROM MOUNTING FL				ŀ			
IMPELLER TYPE .	OD*	NO. BLAD	ES	REMOVABLE FROM SHAI	FT YES	No 🗆			
ADDITIONAL DATA									
		REMARKS							
			 -	·····					
				SAFETY CLA	SSIFICATION	_3_			
105\OS\101\204\84572017.008/WP51/12583	3:27pm			IMPACT LEVEL					

		ATTACHME	NT A	····		REV			
T FLUOR DANIEL		NO. BY	REVISION	SHEET NO.					
CALLOON DANIEL	•	DATE			P33B-DS-6				
DATA	SHEET			DATE	I	FIACT			
				03-01-	-89	845734			
U.S. Department (Hanford Waste Vi	of Energy			IAG NO.	40 E40 00	2			
Hantord Waste Vi Richland, Washin	unication riant oton	 		SPECIFICATION	AG-540-000	J			
DOE Contract DE	-AC06-86RL10838			- OFECIFICATION	14583				
ACIT	ATOR	\sim		ORIG BY	CHK'D	APPR'D			
AGII	AION			J. Janzen	SSL				
						<u> </u>			
SERVICE	OFFGAS TREA	ATMENT CHEMICAL FEE	D TANK AGITATOR (TK-5	40-004)					
NO. UNITS1	TYPE: PORTABLE _	SIDE ENTERIN	G TOP ENTER	NG X ENT	ERING				
	U.O. TO DE MINER	<u> </u>	Ŋ						
	ALS TO BE MIXED	BATCH		uous 🛄	T	rsig			
COMPONENT OFFGAS TREATMENT	QUANTITY - LBS	VISCOSITY - Cp	SP GRAVITY	т	 	310			
CHEMICAL SOLUTION		0.88	1.0	77	+ -	0.1			
SEMIONE SULUTION		4.40	***	• •	+				
	 				+				
	 		 						
FINAL MIX	<u> </u>	0.88	1.0	77	 	0.1			
	ND DISSOLVE X		SUSPEND SOLIDS	HEAT EXCHANGE	FMILLS	IFY 🔲			
	2205150	RECIPITATION	GOOLEMD GOFING		YES 🔲				
	D X MEDIUM			FOAMING					
DEGREE OF AGITATION: MIL TOO MUCH AGITATION WILL _		VIOLENT L	LASHING						
TOO LITTLE AGITATION WILL									
IF BATCH, LARGEST OR LEVEL		500 GALL		SMALLEST2	00 GALLON	s			
MIXER SHALL BE DESIGNED TO	DISSOLVE OFFGAS			IN 10					
<u> </u>				- <u> </u>					
MIXER WILL X WILL NOT									
VESSEL: OPEN	TOP CLOSED TO	DP X HORIZ I	VERTICAL X API	IANK 🔲		LENGTH "			
	_	-		[Y]	E 🔲	£2.49111			
BOTTOM TYPE:		ANGED AND DISHED			السحا				
TOP TYPE:		ANGED AND DISHED L	2:1 SEMI-ELLIP	TICAL L△	•				
MIXER MOUNTING			PRIDAT						
	OR MOUNTING FLANGEPS		DECION TEMP	RATURE		150 ∘ _F			
			GTH	IN VERTICAL L	HORIZON	TAL L.			
MIXER: MOTOR DRIVE:	AC X DC E	KP PROOF L TEFC	D.P						
ľ			TAKE AOFI 2						
SHAFT SEAL: MECHANICAL	•				-				
SIZE OPENING FOR IMPELLER									
HEAD ROOM ABOVE VESSEL F			<u> </u>						
MATERIALS OF CONSTRUCTIO				NIMUM BEARING LIFE (I	-10\	-			
MINIMUM AGMA SERVICE FACT	TOR FOR GEAR REDUCER			MIMUM BEARING LIFE (-10)				
		DATA BY V	ENDOR						
MIXER MODEL NO.									
DRIVE: HORSEPO	WER RPM .								
GEAR: RATIO				 		MFGR			
SHAFT COUPLING: DESC MECHANICAL SEAL: DESC									
	RIBE								
			FLANGE, INCHES						
IMPELLERTY				REMOVABLE FROM SI	AAFT VEA				
ADDITIONAL DATATY	rcUl	NO. B		HEMOTABLE FROM SI	MAET TES				
		REMAF	RKS						
		H, WY		**					
						ON _3_			
105\OS\101\204\84572011.002/WP51	/125833;29pm			IMPACT LE	VEL				

		ATTACHME	ZIVI A		
FLUOR DANIEL	L	NO BY	REVISION	SHEET NO.	REV.
			· · · · · · · · · · · · · · · · · · ·	DATE P336	B-DS-7 0
DATA	SHEET	 			CONTRACT
U.S. Department	of Energy	KY —		7AG NO.	89 845734
U.S. Department of Hanford Waste Vi	itrification Plant		·		AG-540-005
 Richland, Washine 	ngton E-AC06-86RL10838			SPECIFICATIO	
				——	14583
AGIT/	ATOR	 		ORIG BY	CHK'D APPR'D
				J. Janzen	S2ST
SERVICE	KOHIFF	OFF MODIFIED FFFD TAI	NK AGITATOR (TK-540-000		
NO. UNITS1					EDING
					:Hinks
COMPONENT	ALS TO BE MIXED QUANTITY - LBS	7- 	T	NUOUS 🖾	T
POTASSIUM HYDROXIDE/	6396	VISCOSITY - Cp 9.5	SP GRAVITY 1.53	F 77	PSIG -0.1
FRIT MODIFIER SOLUTION				,,	~
	<u> </u>				
					
FINAL MIX 51.7% KOH		9.5	1.53	77	-0.1
CLASS OF AGITATION: BLEI	ND DISSOLVE X	DISPENSE GAS	SUSPEND SOLIDS	HEAT EXCHANGE	EMULSIFY .
	HER <u>Prevent Pf</u>	RECIPITATION	·		YES NO X
DEGREE OF AGITATION: MILE TOO MUCH AGITATION WILL	D X MEDIUM	VIOLENT RESULT IN SPL			· ·
TOO MUCH AGITATION WILL				, <u></u>	
IF BATCH, LARGEST OR LEVEL I				20	- CALLONE
MIXER SHALL BE DESIGNED TO				SMALLEST	
				IN	MINUTES
MIXER WILL X WILL NOT					
	TOP CLOSED TO	P X HORIZ D	VERTICAL X API	TANK 🔲	
	t.D. * X	_	_		LENGTH
BOTTOM TYPE:	P	ANGED AND DISHED			
TOP TYPE: MIXER MOUNTING F		ANGED AND DISHED			
	Flange: Siz Dr Mounting Flange	ZE		ANSI 150# RF	
	DR MOUNTING FLANGE EPSI		<u> </u>		150
				RATURE	
BAFFLES: NO	MIDTH	IN LENG	GTH	. IN VERTICAL 🔲	HORIZONTAL
MIXER: MOTOR DRIVE:	AC IX DC I EXI	(P PROOF TEFC D	X D.P.		
SHAFT SEAL: MECHANICAL D					
SHAFT SEAL: MECHANICAL L SIZE OPENING FOR IMPELLER IN		PE LUBRICATION			
HEAD ROOM ABOVE VESSEL FO					· · · · · · · · · · · · · · · · · · ·
MATERIALS OF CONSTRUCTION			•		
MINIMUM AGMA SERVICE FACTO				NIMUM BEARING LIFE (L-1)	
· . · · · · · · · · · · · · · · · · · ·		186.4		IMUM DEARING LIFE (E-I	0)
MIXER MODEL NO.		DATA BY VE	NDOR		
DRIVE: HORSEPOW	FR RPM -				
			OUTPUT RPM		MFGR
	IBE				
MECHANICAL SEAL: DESCRI					
	iiBE				
SHAFT:OD"		ENGTH FROM MOUNTING F			
IMPELLER TYPE ADDITIONAL DATA	ĒOD"	NO. BL/	ADES	REMOVABLE FROM SHAF	FT YES NO
ADDITIONAL DATA		PEMARI			
		REMARK	<u>©</u>		
105\OS\101\204\84572012.003/WP51/12	25033:31pm				ASSIFICATION 3
<u> </u>	20000.0 10/11			IMPACT LEVEL	

		ATTACHMEN	IT A							
FLUOR DANIEL		NO. BY	REVISION	SHEET NO.	D DC 6	REV.				
9				DATE	B-DS-8	TRACT				
DATA SH	EET		· · · · · · · · · · · · · · · · · · ·	03-02		845734				
U.S. Department of E Hanford Waste Vitrifi	Energy cation Plant			TAG NO.	AG-540-01					
Richland, Washingto	n		''	SPECIFICATI	DN SECT NO.	12				
DOE Contract DE-AC	C06-86RL10838				14583					
AGITAT	OR			ORIG BY	CHKD	APPR'D				
				J. Jenzen	SSL	<u>l</u>				
SERVICE	SODIUM	I NITRITE FEED TANK A	GITATOR (TK-540-021)							
		9IDE ENTERING		NG X BTM ENT	TERING					
MATERIAI S	TO BE MIXED	елтон [CONTIN	IN X						
COMPONENT	QUANTITY - LBS	VISCOSITY - Cp	SP GRAVITY	4		PS IG				
SODIUM NITRITE SOLUTION	2967	2.1	1.14	77		-0.1				
					1					
FINAL MIX 20% Wt SNK	2967	1.5	1.14	77		-0.1				
CLASS OF AGITATION: BLEND		DISPENSE GAS	SUSPEND SOLIDS	HEAT EXCHANGE	☐ EMULS	SIFY [
OTHER				_	YES 🗀	NO X				
DEGREE OF AGITATION: MILD	MEDIUM .	VIOLENT -								
TOO MUCH AGITATION WILL		RESULT IN SPLA								
TOO LITTLE AGITATION WILL		DELAY TO DISSOLVE 500 GALLOI			M C41 / O41	<u> </u>				
IF BATCH, LARGEST OR LEVEL BAT MIXER SHALL BE DESIGNED TO				SMALLEST2						
	_			IN		MINUIES				
MIXER WILL X WILL NOT										
VESSEL: OPEN TOP		X HORIZ	VERTICAL X API	TANK L		LENGTH *				
		NGED AND DISHED	2:1 SEMI-ELLIPT	CON X LADI	E 🗆					
		NGED AND DISHED	2:1 SEMI-ELLIPT		- —					
MIXER MOUNTING FLAI		12	RATING	ANSI 150# RF	·	· · · · · · · · · · · · · · · · · · ·				
	OUNTING FLANGE									
Design Pressure	<u>-5/5</u> PSIG	1		RATURE						
	WIDTH	· · · · · · · · · · · · · · · · · · ·		IN VERTICAL .	HORIZON	ITAL 🔲				
		PROOF TEFC X								
SHAFT SEAL: MECHANICAL X										
HEAD ROOM ABOVE VESSEL FOR I	NSTALLING MIXER			<u>.</u>						
MATERIALS OF CONSTRUCTION WE	ETTED PARTS	304L SS		-		_				
MINIMUM AGMA SERVICE FACTOR	FOR GEAR REDUCER _		MII	IIMUM BEARING LIFE (L	-10)					
		DATA BY VEN	NDOR							
MIXER MODEL NO.		,								
DRIVE: HORSEPOWER						MFGR				
		ATING				MFGR				
MECHANICAL SEAL: DESCRIBE										
SHAFT:OD" _	LEN	IGTH FROM MOUNTING F	LANGE, INCHES							
IMPELLER TYPE	OD* .	NO. BLA	DES	REMOVABLE FROM SH	IAFT YES	O NO				
ADDITIONAL DATA										
		REMARK	S							
105\OS\101\204\84572018.009AWP51/1259	00.40			SAFETY C	LASSIFICATI	ON _3				
TOPIN OR TOTAL PLANT (2011 - 1910 AND AND 4 14 15 15 16 16 16 16 16 16 16 16 16 16 16 16 16	A STANDOR			■ @ 4D& /~ T · C	n= 1					

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FLUOR DANIEL		NO. BY DATE	REVISION	SHEET NO.		REV.					
DATA CU	FFT			DATE	3-DS-8 CON	ITRACT					
DATA SH				03-02-	39	845734					
U.S. Department of I Hanford Waste Vitrifi	Energy cation Plant	\sim		TAG NO.	AG-540-01	14					
Richland, Washington DOE Contract DE-A	n	\overline{A}	·	SPECIFICATIO		<u> </u>					
					14583						
AGITAT	OR			ORIG BY J. Janzen	CHK'D SSI	APPR'D					
SERVICE		S EARTH SLURRY FEED BIDE ENTERING									
				F-9	PANG						
COMPONENT	QUANTITY - LBS	BATCH VISCOSITY - Cp	SP GRAVITY	uous ∐ °F	<u> </u>	PSIG					
DIATOMACEOUS EARTH	35	0	_			_					
PROCESS WATER	665	0.98	1.0	77	-	-0.1					
FINAL MIX 5% Wt DES	700	1.11	1.024	77	-	-0.1					
CLASS OF AGITATION: BLEND	DISSOLVE	DISPENSE GAS	SUSPEND SOLIDS	HEAT EXCHANGE	EMULS	SIFY 🔲					
OTHER .				FOAMING	YES 🔲	NO X					
DEGREE OF AGITATION: MILD TOO MUCH AGITATION WILL	MEDIUM X	VIOLENT	SHING								
TOO LITTLE AGITATION WILL		ALLOW DE TO S	ETTLE								
IF BATCH, LARGEST OR LEVEL BATCH IS											
				IN10		MINUTES					
MIXER WILL INOT											
VESSEL: OPEN TOP CLOSED TOP X HORIZ VERTICAL X API TANK SIZE: 3'-0' I.D. " X 3'-0' STRAIGHT SIDE OR LENGTH STRAIGHT SIDE OR											
		IGED AND DISHED	2:1 SEMI-ELLIPTI	CAL CONE	<u></u>	LENGTH *					
		GED AND DISHED	2:1 SEMI-ELLIPTI		ت						
MIXER MOUNTING FLAN		12*		ANSI 150# RF							
	OUNTING FLANGE -5/5 PSIG		*								
	· ··· 			ATURE	-						
MIXER: MOTOR DRIVE: AC	TX DC D EXE	PROOF TEFC X		IN VERTICAL L	HORIZON	TAL 🔲					
	HASE	CYCLE	460 VOLTS								
SHAFT SEAL: MECHANICAL X		LUBRICATION									
SIZE OPENING FOR IMPELLER INST/ HEAD ROOM ABOVE VESSEL FOR IN		12*									
MATERIALS OF CONSTRUCTION WE	-	304L SS		<u> </u>							
MINIMUM AGMA SERVICE FACTOR F			MIN	MUM BEARING LIFE (L-10	0)						
		DATA BY VEN			,						
MIXER MODEL NO.											
DRIVE: HORSEPOWER GEAR: RATIO			01 Tn = 00.			MFGR					
- · · · - - · · · · · · · · · · · · · · ·					 -	MFGR					
			-								
	LENG	STH FROM MOUNTING FL	ANGE INCHES								
MPELLERTYPE .				DEMANADI F FRANCIS	r	ام را ا					
ADDITIONAL DATA		NO. BLAD		REMOVABLE FROM SHAF	ਾ YES L						
······································		REMARKS									
											
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Richland, Washingto DOE Contract DE-AC	n 206-86RL10838			SPECIFICATION	N SECT NO.	····			
		\wedge		OPIC IIV	14583	140000			
AGITAT	JR			J. Janzen	CHKD SSL	APPR'D			
SERVICE	ZEOLITE	SLURRY FEED TANK A	IGITATOR (TK-540-029)						
				NG X BTM ENTE	FING				
MATERIAL S	TO BE MIXED	BATCH [7	uous 🗵					
COMPONENT	QUANTITY - LBS	VISCOSITY - Cp	SP GRAVITY	# F	<u>F</u>	PSIG			
ZEOLITE SLURRY	3049	1,233	1.02	77		0.1			
				<u> </u>	<u> </u>				
			 		 				
FINAL MIX 5% Wt ZES	3049	1,106	1.02	77	 	-0.1			
CLASS OF AGITATION: BLEND	DISSOLVE [DISPENSE GAS	SUSPEND SOLIDS X		<u> </u>				
OTHER		DISPENSE GAG	\$0\$FEND \$00.05	· —-	YES 🔲 1	··· · · · · · · · · · · · · · · · · ·			
DEGREE OF AGITATION: MILD TOO MUCH AGITATION WILL	MEDIUM X	VIOLENT A	ASHING	· • · · · · · · · ·	120				
TOO LITTLE AGITATION WILL									
IF BATCH, LARGEST OR LEVEL BAT			"	SMALLEST	ALLONS				
MIXER SHALL BE DESIGNED TO		BLEND ZEOLITE II	N WATER			MINUTES			
MIXER WILL X WILL NOT					_	_			
VESSEL: OPEN TOP			VERTICAL X API 1	TANK 🔲					
		STRAIGHT				LENGTH *			
		NGED AND DISHED	2:1 SEMI-ELLIPTI	ICAL CONE	X				
		NGED AND DISHED	2:1 SEMI-ELLIPTI	ICAL 🔲					
MIXER MOUNTING FLAN		<u>12*</u>	RATING	ANSI 150# RF					
	OUNTING FLANGE PSIG		DEALON TEMPE			150			
				RATURE					
		PROOF TEFC X	TH	IN VERTICAL L	HORIZON	TAL 🗀			
		PROOF L.J TEFC LA © CYCLE							
SHAFT SEAL: MECHANICAL X			, , , , ,						
SIZE OPENING FOR IMPELLER INST									
HEAD ROOM ABOVE VESSEL FOR IN									
MATERIALS OF CONSTRUCTION WE			· · · · · · · · · · · · · · · · · · ·						
MINIMUM AGMA SERVICE FACTOR I	OR GEAR REDUCER		MIN	IMUM BEARING LIFE (L-1	0)				
		DATA BY VEN	NDOR						
MIXER MODEL NO.									
DRIVE: HORSEPOWER GEAR: RATIO						MFGR			
		(IING				MFGR			
									
									
		IGTH FROM MOUNTING FI			_				
IMPELLERTYPE .	or _	NO. BLA	DES	REMOVABLE FROM SHA	FT YES				
ADDITIONAL DATA		DEMARK							
		REMARK	5			 -			
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Richland, Washingto	n			SPECIFICATIO	AG-540-018	3		
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AGITAT	OR			ORIG BY	14583 CHK'D	APPR'D		
				Q.B. Ngo	SSL	<u> </u>		
SERVICE	ANTI	FOAM FEED TANK AGT	(ATOR (TK-540-034)					
NO UNITS 1				NG X BTM ENTE	FING			
COMPONENT	QUANTITY - LBS	WISCOSITY - CD	SP GRAVITY	uous 🗆 🔻		SIG		
SILICON GLYCOL COMPOUND	210	2000-4000	1.03	77				
PROCESS WATER	1880	0.96	1.0	70				
		 		! 	 			
				ļ	 -			
FINAL MIX 10% wt antifoam	2090	10	1.0	77	A7	DM.		
CLASS OF AGITATION: BLEND	DISSOLVE	DISPENSE GAS	SUSPEND SOLIDS	HEAT EXCHANGE				
OTHER					YES N			
DEGREE OF AGITATION: MILD	MEDIUM .	VIOLENT -						
TOO MUCH AGITATION WILL								
TOO LITTLE AGITATION WILL IF BATCH, LARGEST OR LEVEL BAT		210 GALLONS		SMALLEST50	GALLONS			
IF BATCH, LANGEST OR LEVEL BAT MIXER SHALL BE DESIGNED TO			-	IN		MINUTES		
MIXER WILL X WILL NOT .						_		
VESSEL: OPEN TOP	CLOSED TOP	FILLING ON DRAWING OF	VERTICAL DE ARIE	FARIN [
SIZE: 3-0	I.D. " X	O'TIT STRAIGHT	VERTICAL X API 1			LENGTH "		
BOTTOM TYPE: FL	AT THE	IGED AND DISHED	2:1 SEMI-ELLIPT	CAL CONE				
TOP TYPE: FL		IGED AND DISHED	2:1 SEMI-ELLIPT	ICAL [X]				
MIXER MOUNTING FLAN			RATING	ANSI 150# RF				
·	OUNTING FLANGE -5/5 PSIG		DEGION TEMPER	NATURE		150 °F		
DESIGN PRESSURE								
	WIDTH	PROOF TEFC X		IN VERTICAL	HORIZONT	AL L		
		O CYCLE						
SHAFT SEAL: MECHANICAL	PACKING TYPE	LUBRICATION						
SIZE OPENING FOR IMPELLER INST		12						
HEAD ROOM ABOVE VESSEL FOR II								
MATERIALS OF CONSTRUCTION WE								
MINIMUM AGMA SERVICE FACTOR I				IMUM BEARING LIFE (L-1	<u> </u>	===		
AMPER MAREL AND		DATA BY VEN	IDOR					
MIXER MODEL NO DRIVE: HORSEPOWER	RPM					NEOD.		
GEAR: RATIO						MFGR MFGR		
				······································				
		GTH FROM MOUNTING F	ANGE INCHES					
IMPELLERTYPE				REMOVABLE FROM SHA	ET VEC] NO [
ADDITIONAL DATA						_ NU [_]		
		REMARK	S					
								
				SAFETY CL	ASSIFICATION	v <u>3</u>		
05\OS\101\204\84572021.012/WP51/12593	i3:53pm			IMPACT LEVEL		[

IMPELLER ...

ADDITIONAL DATA _

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TYPE ...

OD"

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l Richland, Washingto	on			SPECIFICATION	AG-580-003	
DOE Contract DE-A	C06-86RL10838			SPECIFICATION	14583	
AGITAT	OR			ORIG BY	CHK'D APPR'D	_
AGIAI		\wedge		M. Feldon	RMM	
SERVICE	DECON FI	RIT SLURRY FEED TANK	(AGITATOR (TK-580-00)	3)		
		SIDE ENTERING		•	RING	_
MATERIAI S	S TO BE MIXED	BATCH [χ] ₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍₍	uous 🛘		
COMPONENT	QUANTITY - LBS	VISCOSITY - CP	BP GRAVITY	- - ←	PSIG	
GLASS FRIT	567	1	2.5	77		_
FORMIC ACID	5.818		1,1	77		
WATER	6,497		1.0	77		
FINAL MIX	7070	1.1	1.045	<u></u>		
CLASS OF AGITATION: BLEND OTHER		DISPENSE GAS	SUSPEND SOLIDS X		EMULSIFY TES NO X	<u></u>
DEGREE OF AGITATION: MILD TOO MUCH AGITATION WILL	MEDIUM X	VIOLENT CAUSE EXCESSIVE ALLOW FRIT TO SE	•	·		
		· · · · · · · · · · · · · · · · · · ·				
IF BATCH, LARGEST OR LEVEL BAT MIXER SHALL BE DESIGNED TO <u>P</u>				SMALLEST30	MINI	
MIXER WILL IN WILL NOT VESSEL: OPEN TOR	BE OPERATED WHILE	FILLING OR DRAWING OF	FF VERTICAL X API		LENG	
TOP TYPE: FI MIXER MOUNTING FLAI	LAT FLAM NGE: SIZE	NGED AND DISHED ON SHED ON SHE	2:1 SEMI-ELLIPT 2:1 SEMI-ELLIPT RATING	ICAL X		
LOCATION AGITATOR N	HOUNTING FLANGE HOUNTING FLANGE	TOP	DECION TEMPE	RATURE	11	50 ·
		IN LENGT				_
MIXER: MOTOR DRIVE: A	c 🗵 DC 🔲 EXP	PROOF TEFC X	D.P. 🔲	THE VERNIONE	HONIZONIAL L	•
SHAFT SEAL: MECHANICAL SIZE OPENING FOR IMPELLER INST	PACKING TYPE	LUBRICATION				
HEAD ROOM ABOVE VESSEL FOR I						
MATERIALS OF CONSTRUCTION WI	ETTED PARTS	316L SS				
MINIMUM AGMA SERVICE FACTOR	FOR GEAR REDUCER _		MIP	VIMUM BEARING LIFE (L-1	0)	
		DATA BY VE	NDOR			
MIXER MODEL NO.				· · · · · · · · · · · · · · · · · · ·		
DRIVE: HORSEPOWER GEAR: RATIO					N	MFG
	AGMA A		— OUITOI NEM ——		N	MFG
MECHANICAL SEAL: DESCRIBE						
SHAFT:OD" _	LEN	IGTH FROM MOUNTING F	LANGE, INCHES			

FRIT IS -80 TO +200 MESH - STD. DISTRIBUTION
SLURRY IS PREPARED BY ADDING WATER TO 60% SLURRY FROM FSMT
SELLER TO PROVIDE IN-TANK SHAFT COUPLING

REMARKS

NO. BLADES

YES NO

REMOVABLE FROM SHAFT

SAFETY CLASSIFICATION

IMPACT LEVEL

ATTACHMENT B EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

TAG NUMBER	MODEL NUMBER	MAXIMUM ENVELOPE (inches)							
		LENGTH	WIDTH	HEIGHT					
AG-520-001	Philadelphia Mixers PMV-01	26	26	156					
AG-520-002	Philadelphia Mixers PMG-2	20	20	123					
AG-520-003	Philadelphia Mixers PMG-2	20	20	123					
AG-520-004	Philadelphia Mixers PMV-01	26	26	156					
AG-520-005	Philadelphia Mixers PMG-15	20	20	138					
AG-540-003	Philadelphia Mixers PMG-15	20	20	116					
AG-540-005	Philadelphia Mixers PMG-2	20	20	118					
AG-540-012	Philadelphia Mixers PMG-15	20	20	116					
AG-540-014	Philadelphia Mixers PMG-34	20	20	84					
AG-540-016	Philadelphia Mixers PMG-15	20	20	116					
AG-540-018	Philadelphia Mixers PMG-12	12	12	94					
AG-580-003	Philadelphia Mixers MTE-70S-PTSS	34	34	150					

^{*} Equipment shall be of this model number or equal.

U.S. DEPARTMENT OF ENERGY
Hanford Waste Vitrification Plant
Richland, Washington
DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 14584W COLD FEED AGITATOR B-595-P-P33B-14584W

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE $2-2-93$	WAPA YES X NO QUALITY LEVEL I X II SAFETY CLASS 1 2 3X 4
ORIGINATOR:	CHECKER:
F. Bizjak, Mechanical Engineer Date	D. A. Buzzelli, Lend Disk. Checker Date
APPROVED BY:	
R. B. Erickov C. J. Divona Lead Disciplin	1-26-93 ne Engineer Date

U.S. DEPARTMENT OF ENERGY

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

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SECTION 14584W COLD FEED AGITATOR B-595-P-P33B-14584W

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DOE Contract DE-AC06-86RL10838

SECTION 14584W COLD FEED AGITATOR

PART 1 GENERAL

SUMMARY 1.1

This specification section covers the design, materials, fabrication, quality, inspection, testing and delivery requirements of one agitator for use in non-radioactive slurries and chemicals. The requirements outlined herein supplement the agitator data sheet (Attachment A).

REFERENCES 1.2

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) and/or

AMERICAN GEAR MANUFACTURERS INSTITUTE (AGMA)

ANSI/AGMA 6000

1988 (Rev. A) Specification for

Measurement of Linear Vibration on Gear

Units

ANSI/AGMA 6010

1988 Standard for Spur, Helical,

Herringbone and Bevel Enclosed Drives

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

and/or

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ANSI/ASME B16.5

1988 Pipe Flanges and Flanged Fittings

ANSI/ASME B46.1

1985 Surface Texture (Surface Roughness,

Waviness, and Lay)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A182/A182M

1991 Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-

Temperature Service

ASTM A240

1991 (Rev. A) Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and

Strip for Pressure Vessels

ASTM A312/A312M

1991 (Rev. B) Standard Specification for

Seamless and Welded Austenitic Stainless

Steel Pipe

ASTM A479/A479M

1991 (Rev. A) Standard Specification for Stainless and Heat-Resisting Steel Bars and Shapes for Use in Boilers and Other

Pressure Vessels

ASTM A744/A744M

1991 Standard Specification for Castings, Iron-Chromium Nickel, Corrosion Resistant,

for Severe Service

ANTI-FRICTION BEARING MANUFACTURERS ASSOCIATION (AFBMA)

AFBMA 9

1990 Load Ratings and Fatigue Life for

Ball Bearings

AFBMA 11

1990 Load Ratings and Fatigue Life for

Roller Bearings

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA Standard

1978 Guards for Rotating Equipment

Instruction 1-12.14

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-6

1989 Surface Preparation Specification

No. 6, Commercial Blast Cleaning

SSPC SP-10

1989 Surface Preparation Specification

No. 10, Near-White Blast Cleaning

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

Specification Section 05066 Welding Specialty Equipment

Specification Section 13252 Precaution for the Fabrication.

Handling and Storage of Stainless

Steel and Nickel Alloys

Specification Section 15196 Identification and Tagging Methods

for Mechanical Equipment

Specification Section 16150 Motors - Induction for General

Service

1.4 **DEFINITIONS**

CMTR - Certified Material Test Report

- Factory Acceptance Test NDE - Nondestructive Examination PT - Liquid Penetrant Examination RPM - Revolutions per Minute

- Totally Enclosed Fan Cooled

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 **SUBMITTALS**

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

- 1.6.1 Assembly and outline drawings of the equipment shall be submitted for Buyer approval. The following information shall be included on or submitted with the drawings:
 - Α. Two views of the agitator assembly (plan and elevation).
 - В. Cross-section of drive assembly. Cross-section shall show shaft diameter and bearing spans.
 - С. Stuffing box assembly.
 - D. Complete specification, designation and Certified Material Test Reports (CMTRs) of all materials.
 - Ε. Weight of agitator assembly. This weight shall include the driver, mounting plate and lifting assembly weights. All loads (torque, bending moments) imposed on the vessel nozzle shall be shown. Weights of separate removable parts shall be shown if agitator cannot be removed as a complete assembly. Weights of agitator assembly components (electric motor, reduction gear box and agitator shaft and impeller) shall be shown on the drawings.
 - Dimensions. These shall include height, width, maintenance F. space required, service connection locations, mounting details, mounting flange details, lifting assemblies and other pertinent dimensions with reference to the datum plane (bottom of mounting plate).
 - G. Buyer purchase order and item numbers.
 - Η. Bill of materials.

- Instructions for operation, maintenance and storage shall be submitted for Buyer review. These instructions shall incorporate theory of operation, operational adjustments, troubleshooting, instructions for assembly and disassembly and complete parts list with part numbers. Site storage instructions shall include requirements for handling, and short-term and long-term storage. Data shall be submitted in accordance with Specification Section 01730. Complete installation manuals shall also be submitted.
- 1.6.3 A list of recommended spare parts for one (1) year's routine operation shall be supplied. The spare parts list shall include sufficient data to permit procurement of standard parts from the original manufacturer or any sub-supplier. Seller shall provide a sectional view of the identified parts.
- 1.6.4 Completed agitator data sheet (Attachment A). Electric motor data sheet (Attachment A) of Specification Section 16150 shall be completed and submitted.
- 1.6.5 Design Calculations

An engineering design analysis shall be provided. The analysis shall contain supporting calculations used to establish horsepower requirements, shaft sizes, bearing loads, nozzle loads, operational characteristics and technical descriptions. Calculations shall be complete and in sufficient detail to permit second party review. Seller shall establish and guarantee the forces and moments on the agitator nozzle. Lifting eye calculations shall be included.

Seller calculations shall show that the agitator will provide uniform mixing even when reduced to 95% of the impeller area by erosion from the mixed liquid.

- 1.6.6 Certified Factory Acceptance Test (FAT) procedures, inspection and quality assurance control plan in accordance with Paragraph 2.5.
- 1.6.7 Certified performance FAT results prior to shipment in accordance with Paragraph 2.5.
- 1.6.8 Lubrication requirements in accordance with Paragraph 2.2.4.
- 1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

- 1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS
- 1.8.1 Climatic and Geographic Site Conditions
 - A. Site Elevation

714 feet above sea level

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

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В.	Barometric	Pressure	14.3 psia

- C. Outside Design Temperature
 - 1) Maximum Design Temperature 110°F
 - 2) Minimum Design Temperature -20°F
 - 3) Wet Bulb Design Temperature 68°F
- 1.8.2 Operating Environment

Α.	Normal	Temperature	60°F	to	104°F

В. Maximum Temperature 104°F

C. Relative Humidity Not controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 Materials

- 2.1.1.1 All pipe, fittings, plate, bar, castings and forgings shall be in accordance with ASTM A182/A182M, ASTM A240, ASTM A312/A312M, ASTM A479/A479M and ASTM A744/A744M as applicable. Wet-end components and those components likely to be exposed to vapors of chemicals being handled shall be stainless steel. These include impeller, shaft, outboard bearing, shaft seal housing and mounting flange facing. Type of stainless steel to be used for wetted parts shall be in accordance with Data Sheet P33B-DS-1 (Attachment A).
 - Α. Seller may utilize standard materials of construction on internal gear reducer, motor, bearing and coupling components. Exterior surfaces of the above components may also be Seller's standard materials of construction.
 - В. All other components shall be Seller's standard materials of construction.
- 2.1.1.2 A design envelope and a model number of the agitator is referenced in Attachment B.

2.2	FABRICATION	AND	MANUFACTURE

- 2.2.1 General Requirements
- 2.2.1.1 The agitator shall provide mixing of components shown on Data Sheet P33B-DS-1 (Attachment A) with respect to class and degree of agitation.
- 2.2.1.2 The equipment shall be designed for mounting on the type of vessel as stated on Data Sheet P33B-DS-1 (Attachment A).
- 2.2.1.3 The equipment shall have a design life of not less than 20 years at the specified conditions. This requirement excludes expendable items such as impellers, bearings, seals and gaskets.
- 2.2.1.4 The agitator will be used for chemical agitation in a nuclear waste processing facility. The agitator shall not, however, be exposed to radiation.
- 2.2.1.5 The agitator shall be Seller's standard low-risk design, modified as required to be in accordance with this specification section.
- 2.2.1.6 The equipment shall be of proven design with a minimum of two years of successful operation in equal or more severe design and operating conditions as outlined in the agitator specification section.
- 2.2.1.7 Seller shall follow the requirements of Specification Section 13252 both prior to and after welding to minimize contamination of stainless steel.
- 2.2.2 Technical Requirements
- 2.2.2.1 Bearings shall be of the sealed anti-friction type. They shall be in accordance either with AFBMA 9 or AFBMA 11. Bearing L-10 life shall be not less than 100,000 hours. Agitator shall be designed for start-up torques at least double the expected running torques. Bearings shall be fitted with zerk fittings and purge ports.
- 2.2.2.2 The agitator shall be single speed, top entering and flange mounted on a closed tank. The agitator shall be provided with stuffing box and non-lubricated packing as required on Data Sheet P33B-DS-1 (Attachment A). Direction of agitator shaft rotation shall be clockwise looking downward.
- 2.2.2.3 A service factor of not less than 1.5 shall be used in accordance with ANSI/AGMA 6010, Appendix A, Table A-3, unless otherwise specified on Data Sheet P33B-DS-1 (Attachment A). A "Uniform" load classification shall be used. A gear drive shall be either helical or herringbone type in accordance with ANSI/AGMA 6010. AGMA gear quality class shall be 10 or better. Mechanical rating

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shall be not less than 1.5 times the nameplate motor horsepower. Thermal horsepower shall be not less than nameplate motor horsepower. The mixer blade tip speed shall not exceed 800 ft/min. Said mixer blade shall be sized to provide uniform mixing when eroded to 95% of its initial area.

- A shaft shall be sized to withstand forces resulting from starting at maximum tank level and operating in empty tank. Impeller thrust in the fluid shall be downward and shaft thrust shall be upward. Bottom steady bearings shall not be provided. The agitator shaft may be hollow. The shaft's calculated maximum combined shear stress shall be less than 20% of the construction material's tensile yield strength. Shafts shall be straight to within 0.003 in/ft.
- 2.2.2.5 The first critical speed shall be not less than 135 percent of the maximum operating speed.
- 2.2.2.6 All assembly joints shall include alignment or centering fits as required to ensure accurate reassembly of all parts. Shaft and impeller assembly shall be bolted. The assembly shall be secured to prevent impeller blade unbolting. The impeller shaft assembly shall be statically balanced as follows:
 - A. Impeller shaft speed up to 125 rpm inclusive to 0.5 ounce-inch per pound of rotating weight.
 - B. Impeller shaft speed from 125-350 rpm to 0.25 ounce-inch per pound of rotating weight.
- 2.2.2.7 The vibration limits shall be in accordance with ANSI/AGMA 6000.
- Pressure-containing components shall be suitable for the design pressure and temperature of the mixing vessel. This requirement includes mounting flanges. Flanges shall be in accordance with ANSI/ASME B16.5. Flange size and rating shall be as specified on Data Sheet P33B-DS-1 (Attachment A). The mounting flange facing shall have a surface finish of 125 RMS in accordance with ANSI/ASME B46.1.
- 2.2.2.9 Seller shall provide a flexible, forged steel coupling between the power drive and the agitator gear drive. Motor to reducer input coupling shall have a service factor of not less than 2.0 based on motor capacity. Inside tank coupling is required for removal of shaft assembly when specified on Data Sheet P33B-DS-1 (Attachment A). Coupling materials shall be compatible with shaft materials.
- 2.2.2.10 Couplings shall be keyed in both shafts. The coupling design shall allow removal of the hub without the need for heating. All exposed rotating parts shall be provided with heavy-duty guards in

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Richland, Washington DOE Contract DE-AC06-86RL10838

> accordance with OSHA Standard Instruction 1-12.14. Guards shall be removable.

- 2.2.2.11 The agitator design shall include provisions for ensuring that drive and agitator components are aligned during assembly.
- 2.2.2.12 The design shall be such that bearings, seals, driver and gear units may be replaced without dismantling other major parts. It shall also be possible to replace these parts without emptying or depressuring the vessel.
- 2.2.3 Shaft Seal

The shaft seal type shall be as specified on Data Sheet P33B-DS-1 (Attachment A). Seal parts shall be inert both to the fluids being mixed and to any lubricant used. Nonmetallic components are included in this requirement. The use of any pressurized external lubrication system shall not be acceptable.

- Stuffing boxes shall include the following minimum design 2.2.3.1 characteristics:
 - Α. They shall be an integral part of the cover.
 - В. Seal cage design shall allow easy removal.
 - They shall have not less than 3 rings of packing plus the С. seal cage.
 - D. The design shall allow space to permit packing replacement without removing or dismantling any part other than the gland and seal cage.
- 2.2.4 Lubrication Requirements

Seller shall submit the lubrication requirements for the agitator on Seller's lubrication data sheet. Lubricants shall be recommended by Seller. Lubricants shall be able to be drained and replenished. A synthetic gear lubricant is preferred.

- 2.2.5 Electric Motor
- 2.2.5.1 Seller shall provide the agitator with a totally-enclosed fancooled (TEFC) chemical-type motor in accordance with Specification Section 16150. Seller shall complete electric motor data sheet from Specification Section 16150 (Attachment A). Drive motor shall be vertical.
- 2.2.5.2 The motor thrust bearing shall have a minimum rating of 120 percent of the maximum axial thrust load that can be transmitted to the bearing.

- 2.2.5.3 The motor shall be single-speed. It is intended that the motor be the weakest link in a high-torque event and that the shaft, impeller blades, etc. do not fail in any such event.
- 2.2.5.4 The motor shall be suitable for continuous duty.
- 2.2.6 Welding

Welding (if required) shall be in accordance with Specification Section 05066.

2.2.7 Painting

- 2.2.7.1 Stainless steel and nickel-based alloy construction materials shall not be painted. All carbon steel exposed surfaces shall be shop-primed and finish-painted in accordance with Seller's standards.
- 2.2.7.2 All machinery and equipment shall have a clean and finished appearance when delivered to Buyer. Prior to painting all surfaces shall be free of dirt, rust, grease, weld spatter, loose mill scale or other deleterious substances. Surfaces to be painted shall be cleaned in accordance either with SSPC SP-6 or SSPC SP-10 in accordance with Seller's surface preparation procedure. The paint type and quality shall be Seller's standard. It shall be applied in accordance with the paint manufacturer's recommended procedures. Colors will be advised by Buyer.
- 2.2.8 Noise

The noise level shall not exceed 85 dBA at 3 feet periphery around the agitator mounting flange.

2.2.9 Performance

Seller shall guarantee that the agitator is in accordance with all specified operating conditions and is a satisfactory application in all respects to the conditions described both in this specification section and Data Sheet P33B-DS-1 (Attachment A).

- 2.2.10 Lifting Eyes
- 2.2.10.1 Lifting eyes shall be furnished for crane handling. These shall be positioned to give maximum balance with an even weight distribution to minimize handling hazards. Each lifting eye shall be designed to carry twice the lifting load. Agitator lifting assemblies shall be designed and fabricated with two lifting eyes.

AND	DESTGN	CONDITIONS
	AND	AND DESIGN

- 2.3.1 Operating Conditions
- 2.3.1.1 Refer to Data Sheet P33B-DS-1 (Attachment A) for operating conditions.
- 2.3.2 Design Conditions

The agitator shall be designed to operate in a process tank under design conditions stated in Data Sheet P33B-DS-1 (Attachment A).

2.4 LABELING

81-90707846

Labeling shall be in accordance with Specification Section 15196. This shall be in addition to the manufacturer's identification plate. The nameplate shall be stamped or embossed with not less than the following information:

Purchase order number
Equipment number
Manufacturer's model number
Rated horsepower
Impeller diameter
Impeller RPM
Materials of construction of wetted parts

The nameplate shall be completely visible after assembly of the equipment.

2.5 TESTING AND INSPECTION

2.5.1 General

- 2.5.1.1 Seller shall supply Buyer with all certified test data whether witnessed or not. Agitator shall not be shipped until Buyer has reviewed test data. All equipment shall be completely shopassembled. Locating dimensions of mounting bolt holes shall be verified.
 - A. The agitator shall be no-load tested for 15 minutes or until oil temperatures have stabilized. The agitator shall then be tested complete with agitator shaft in accordance with test procedure to be submitted for Buyer approval. The test medium shall be water.
 - B. Seller shall provide test procedures that demonstrate the performance characteristics of the agitator (i.e., efficiency, mixing characteristics, horsepower needed, maximum volume capability for mixing designated liquid or

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slurry as specified in Data Sheet P33B-DS-1 (Attachment A). Test procedures shall be approved by Buyer before use.

- C. Seller shall provide certified results and reports for all FATs performed.
- D. Vibration tests of complete assembly shall be performed in accordance with ANSI/AGMA 6000.
- 2.5.1.2 Seller shall furnish copies of their inspection and quality control plan to Buyer.
- 2.5.1.3 Materials and workmanship shall be subject to inspection by Buyer. Inspection shall take place in Seller's shop.
- 2.5.1.4 At minimum the Buyer's inspector shall check equipment components, tagging, critical installation dimensions, connection sizes, connection locations and quality of workmanship against certified drawings, data and purchase order documents.
- 2.5.1.5 Preparation for shipment shall be subject to inspection.
- 2.5.2 Nondestructive Examination - General
- 2.5.2.1 Nondestructive Examination (NDE) acceptance criteria of welds shall be in accordance both with Specification Section 05066 and this specification section.
- 2.5.2.2 All welds shall be 100% radiographically examined. Where it is not physically possible to perform radiographic examination, welds shall be examined by liquid penetrant examination (PT). Where it is not physically possible to radiograph lifting eye welds, 100% of the root and final weld passes shall be PT examined.
- 2.5.3 Final Dimensional Checks

After fabrication and testing Seller shall verify measurements by means of as-built dimension drawings. The procedure selected for final dimensional check shall be submitted for Buyer approval. Buyer may witness Seller's dimensional verification measurements at Buyer's option. Seller shall provide proof that the agitator and agitator appurtenances are dimensionally correct within the specified tolerances in accordance with this specification section.

2.6 **PACKAGING**

Preparation for shipment and packing may conform to the Seller's standards. At minimum, the packaging shall provide protection against corrosion and damage from normal handling and storage. Minimum preparation shall include the requirements listed below.

- A. Machined surfaces, threads, bearings and bearing housings shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- B. Threaded connections and tapped holes shall be capped or plugged. Compatible materials shall be used to prevent thread damage.
- C. The agitator motor shall be fully protected against moisture penetration to the electrical compartments and winding.
- D. Mechanical seals and other sealing devices shall be installed for shipment.
- E. Bracing, supports and rigging connections shall be provided to prevent damage during shipment, lifting and unloading. Lifting points shall be clearly marked.
- F. Separate or loose parts shall be completely boxed and attached to the main item to be shipped as a unit. All shipping boxes shall be identified by the Seller's order number, equipment number and equipment description.

PART 3 EXECUTION

(Not Used)

END OF SECTION

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ATTACHMENT A

		ATTACHINE	INI A			
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ATTACHMENT B EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

TAG NUMBER	NODEL NUMBER*	MAXEMUM LENGTH	ENVELOPE ((inches) HEIGHT
AG-580-002	Philadelphia Mixers MTE-90S-PTSS	38	38	170

^{*} Equipment shall be of this model number or equal.

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 15139 AIR DRIVEN DIAPHRAGM PUMPS B-595-P-P33B-15139

APPROVED FOR CONSTRUCTION

REVISION ISSUE DATE	0 2-2-93	WAPA QUALITY LEV SAFETY CLAS	YES NO _X EL

CHECKER:

J. J. Ichkhan, Mechanical Engineer Date D. A. Buzzelli Lad Disc. Checker Date

APPROVED BY:

ORIGINATOR:

R.B. Euckson
C. J. Divona

Lead Discipline Engineer

<u>1-26-93</u> Date

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

Rev. 0

SECTION 15139 AIR DRIVEN DIAPHRAGM PUMPS B-595-P-P33B-15139

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PART	2 PRO 2.1 2.2 2.3 2.4 2.5 2.6	DUCTS MATERIALS FABRICATI COATINGS TESTING . LABELING PACKAGING	AND E	QUIPME MANUE		•	· · · · · · · · · · · · · · · · · · ·		•	• •		•	• •	•	•	•	•	•	4 4 6 7 7 7
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ATTACHMENTS

<u>ATTACHMENT</u>	TITLE
Α	DATA SHEETS
В	EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

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SECTION 15139 AIR DRIVEN DIAPHRAGM PUMPS

PART 1 GENERAL

1.1 SUMMARY

This specification section covers the technical requirements for the design, fabrication, inspection and testing of air-driven diaphragm pumps. These pumps will be used in glass frit slurry service.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TEST AND MATERIALS (ASTM)

ASTM A217/A217M

1988 Standard Specification for Steel Castings, Martensitic Stainless and Alloy for Pressure-Containing Parts, Suitable for High Temperature Service

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
Boiler and Pressure Vessel Code

ASME Section VIII, Division 1

1989 Rules for Construction of Pressure

Vessels

HYDRAULIC INSTITUTE (HI)

ΗI

1983 Standards for Centrifugal, Rotary and Reciprocating Pumps, 14th Edition

INSTRUMENT SOCIETY OF AMERICA (ISA)

ISA S20

1981 Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-6

1989 Surface Preparation Specification No. 6, Commercial Blast Cleaning

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

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Specification Section 15196 Identification and Tagging Methods

1.4 DEFINITIONS

CMTR - Certified Material Test Report

FAT - Factory Acceptance Test

Flow Repeatability - Describes the reproducibility of pump flow rate under a given set of conditions when capacity setting is varied and then returned to the set point being tested. Expressed as a percent of rated capacity.

for Mechanical Equipment

Turndown Ratio - The ratio of rated capacity to minimum capacity that can be obtained while maintaining a specified repetitive accuracy.

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

- 1.6.1 Certified Material Test Reports (CMTRs) for the air driven diaphragm pumps. These CMTRs shall be in accordance with the requirements both of this specification section and Data Sheets P33B-DS-1, DS-2, DS-3 and DS-4 (Attachment A).
- 1.6.2 Outline drawing shall be submitted for Buyer approval. This drawing shall indicate dimensions, weights, anchor bolts and base plate details.
- 1.6.3 A list of recommended spare parts for one (1) year's routine operation shall be supplied. The spare parts list shall include sufficient data to permit procurement either from original manufacturer or any subsupplier.
- 1.6.4 Operation and maintenance manuals shall be provided in accordance with Specification Section 01730. Complete installation manuals shall also be submitted.
- 1.6.5 Factory Acceptance Test (FAT) reports shall be submitted for Buyer approval in accordance with Paragraph 2.4.

1.6.6 Design Calculations

A mechanical design analysis shall be supplied. This analysis shall include supporting calculations used to establish operating characteristics in accordance with Data Sheets P33B-DS-1, DS-2, DS-3 and DS-4 (Attachment A). These calculations shall be complete and in sufficient detail to permit second-party review.

1.6.7 Data Sheets

- A. Seller shall submit complete data sheets for the furnished equipment. These data sheets shall reflect the design parameters in Data Sheets P33B-DS-1, DS-2, DS-3 and DS-4 (Attachment A).
- B. Seller shall submit complete instrumentation data sheets. ISA S20 specification forms for process measurement and control instruments, primary elements and control valves shall be submitted.

1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

Α.	Site Elevation	714 feet above sea level
В.	Barometric Pressure	14.3 psia

C. Outside Design Temperature

Relative Humidity

- 1) Maximum Design Temperature 110°F
- 2) Minimum Design Temperature -20°F
- 3) Wet Bulb Design Temperature 68°F

1.8.2 Operating Environment

C.

Α.	Normal Temperature	60° to 104°F
В.	Maximum Temperature	104°F

Not controlled

PART 2 PRODUCTS

9413202.0658

- 2.1 MATERIALS AND EQUIPMENT
- 2.1.1 Description
- 2.1.1.1 Work covered by this specification section includes (but is not limited to) design, materials, fabrication, test and delivery of:
 - A. Pneumatically-actuated diaphragm slurry pumps.
 - B. Baseplates.
 - C. Pulsation dampeners.
 - D. Exhaust mufflers.
 - E. Integral air distribution valves.
 - F. A combination filter, lubricator and regulator.
- 2.1.1.2 This specification section does not cover:
 - A. Unloading and storage at jobsite.
 - B. Foundation and anchor bolts.
 - C. Installation labor.
 - D. Piping, valves and fittings external to the equipment that are not specifically identified in this specification section.
- The equipment listed in Paragraph 2.1.1.1 shall be suitable for the conditions of service stated in Data Sheets P33B-DS-1, DS-2, DS-3 and DS-4 (Attachment A). This equipment shall be designed and constructed (except for expendable materials such as gaskets, diaphragms and check valves) for a service life of not less than 20 years.
- 2.1.3 The equipment listed in Paragraph 2.1.1.1 shall be designed to facilitate rapid, economical maintenance. Gaskets, diaphragms and valves shall be easily serviceable. Major parts shall be designed and fabricated to ensure accurate alignment when reassembled.
- 2.1.4 The controlled-volume air driven diaphragm pump shall be designed to allow access for adjustment and/or replacement of the following:
 - A. Air distribution valve.

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Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

- Air distribution valve seals and gaskets. В.
- C. Check valves.
- D. Check valve seats.
- Ε. Diaphragm.
- 2.1.5 The controlled-volume air driven diaphragm pump furnished in accordance both with this specification section and HI requirements shall be capable of continuous operation throughout the range of the pump's capacity. The pump shall be of the diaphragm type, automatically controlled by an outside electrical signal. The diaphragm shall be actuated by a mechanically-coupled push rod. The diaphragm isolates the push rod from the process fluid. A built-in relief valve shall be included to relieve the pump's full capacity. This relief valve shall be set at 20 percent above the maximum operating discharge pressure. Guided, controlled-travel, double-ball check valves shall be included on both suction and discharge. Valves shall have renewable seats of either the screwed-in or shouldered type. Oil lubrication shall be performed either by splash or force-feed system. System shall incorporate self-actuated pressure regulator with an adjustable set point and capacity based on 10 percent offset or drop factor. The pump shall be provided with a manual local stroke adjustment. This is in addition to the remote volume adjuster.
- The air driven diaphragm pump shall be furnished with an automatic 2.1.6 volume control. The volume/capacity control shall be continuously variable from no flow to maximum capacity condition. Repetitive accuracy of all the volume adjustments shall be not less than 98 percent between the range of 10 to 100 percent of the specified pump capacity.
- 2.1.7 The pump flow rate shall be adjustable over the specified turndown ratio while pump is running.
- 2.1.8 Rated capacity shall be not less than 110 percent of the maximum capacity specified in Data Sheets DS-1, DS-2, DS-3 and DS-4 (Attachment A).
- Flow repeatability shall be within ±3% over the specified 2.1.9 turndown ratio.
- Diaphragm material shall be compatible with the fluid it contacts 2.1.10 at temperatures specified in accordance with Data Sheets DS-1, DS-2, DS-3 and DS-4 (Attachment A). This material shall be of sufficient thickness and density to prevent permeation.

Diaphragm shall be Viton or equal material for the service required.

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- 2.1.11 The air driven diaphragm pump shall be equipped with pulsation dampeners. These pulsation dampeners shall be of the diaphragm type. They shall be equipped with the means for recharging with air.
 - A. The pulsation dampener diaphragms shall be designed to withstand a differential pressure not less than 10 percent greater than the maximum discharge pressure of the pump for which they are supplied.
 - B. Materials used for pulsation dampeners shall be as corrosion and erosion resistant as the pump for which they are supplied.
- 2.1.12 The air driven diaphragm pump shall be equipped with an air exhaust muffler. This muffler shall be sized to limit equipment noise at the rated flow and pressure specified on Data Sheets DS-1, DS-2, DS-3 and DS-4 (Attachment A). Noise level shall not exceed 85 dB at 3 feet peripheral around the pump.

2.2 FABRICATION AND MANUFACTURE

2.2.1 Material for the air driven diaphragm pump casing shall be stainless steel in accordance with ASTM A217/A217M. Castings shall be sound. No shrink, blow holes, scale, blister and other defects shall be permitted. Surfaces shall be cleaned by manufacturer's standard methods. All casting burrs shall be filed or ground flush with the casting surface. The use of plastic or cement compounds to repair leaks and defects in pressure casings shall not be permitted.

Design stress, temperature restrictions and physical properties for the pump material shall be in accordance with the limitations for similar materials in ASME Section VIII, Division 1. Pressure-containing parts shall be built in accordance with ASME Section VIII, Division 1. Code stamp and data report forms are not required.

- 2.2.2 The baseplate shall be equipped with four (4) holes and shall be 316L S.S. These holes shall be 1/2 inch in diameter. They shall be used to accommodate four (4) 5/16-inch bolts. The bolts shall be of 316L S.S.
- 2.2.3 Inlet and outlet connections shall be in accordance with Data Sheets P33B-DS-1, DS-2, DS-3 and DS-4 (Attachment A).
- 2.2.4 The maximum available envelope for the air driven diaphragm pumps and the model numbers or equal are shown in Attachment B.

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2.3 COATINGS

Each piece of equipment shall be thoroughly cleaned of all foreign material, including rust, after all fabrication procedures are completed. Cleaning shall be in accordance with SSPC SP-6. Manufacturer's standard prime and finish paint or coatings shall be applied. Stainless steel, nickel, brass, copper, monel, aluminum, hastelloy, lead, galvanized steel, plastics, elastomers and glass surfaces shall not be painted unless specified otherwise.

2.4 TESTING

Factory Acceptance Tests (FATs) 2.4.1

> Factory acceptance tests (FATs) shall be performed in accordance with HI requirements. Buyer shall be notified in advance of all testing. Buyer reserves the right to witness all tests (FATs).

- 2.4.2 Test procedures for hydrostatic testing, production testing and calibration testing with inspection shall be in accordance with HI test standards. These procedures shall be submitted for Buyer approval.
- 2.4.3 FAT reports shall be submitted for Buyer approval.

2.5 LABELING

Labeling shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6. Such labeling shall be in addition to the manufacturer's identification plate.

2.6 **PACKAGING**

- Preparation for shipment and packing shall be in accordance with 2.6.1 Seller's standards. At minimum, packaging shall provide protection against corrosion and damage during normal handling, shipping and storage. Minimum preparation shall include the requirements listed below.
- 2.6.2 Machined surfaces, threads, bearings and bearing housings shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- 2.6.3 Flanged openings shall be covered with wood or plastic protectors. Protectors shall be installed with a minimum of four (4) full diameter bolts and nuts of compatible material with the flange.
- 2.6.4 Threaded connections and tapped holes shall be capped or plugged to prevent thread damage. Compatible materials shall be used.

1 1 1

2.6.5 Pump Unit Assemblies shall be shipped fully assembled on baseplate.
2.6.6 Controller shall be shipped separately. It shall be field wired to the pump assembly from the remote location.
2.6.7 Bracing, supports and rigging connections shall be provided to prevent damage during shipment, loading and unloading.

the main item to be shipped as a unit.

Separate or loose parts shall be completely boxed and attached to

PART 3 EXECUTION

2.6.8

(Not Used)

END OF SECTION

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	FORMIC AC	D/GLASS FRIT	HYDRAULIC POWER (HP):	1.5		10	o PSIG	
REMARKS:					<u>l</u>			
			PERFORMANCE (TO BE CO	PLETED BY MANUFACT	VREN			
PROPOSAL CURVE	NO.:		MINIMUM CONTINUOUS FLO	W (GPM):	NPSH REQU	IRED (FEET WAT	TEFF):	-
SPEED (RPM):			THERMAL	STABLE	3%, HE	AD DROP		
EFFICIENCY (%):		 _	MAX. HEAD PATED IMP. (FEE	T):	SUCTION SP	ECIFIED SPEED	:	
RATED POWER (BI	(P):		MAX. POWER RATED IMP. (B)	IP):				
		CONE	TIPLICTION (TO BE COMPLETED	BY PURCHASIER AND I	MAUFACTURER			
	F	wo		in .				
MOZZLES	912E	PATING	917E	FACING	MBC. CONN	ECTIONS	8LZE	TYPE
SUCTION	2*	MPT (F)	1/2	MPT (F)	DRAIN		7"	MPT(F)
DISCHARGE	2	MPT (F)	ser	MPT (F)	VENT		1/2	MPT(F)
CASING MOUNT:	LEGOT	☐ BRACKET	IMPELLER DIAMETER (INCHES)	PRESSURE G	AGE		
	NEAR CHTRL		RATE MAX	MIN	WARM UP			
CASING SPLIT:		☐ RADIAL	IMPELLER TYPE: OPEN	CLOSE	BALANCE			
CASING TYPE:		STAGGERED	IMP SUCTION: SINGLE		´	1		L
SINGLE VO	· -	UBLE VOLUTE	IMP MOUNT: BTWN.	=		ACTURER		
MAX. ALLOWABLE I		OBLE VOLUTE	ROTATION (COUPLING END):		DING			
	100		HOTATION (COUPLING END): BEARING (TYPE/NUMBER):	L CW LJ CCW		O. RINGS		
AT NOM. PUMF			RADIAL	_AVA	MECHANICAL			
	SURE (PSIG):	150	TRUST			ASS CODE		
	. [FSIG).		COUPLING:			FACTURER	 - <u>-</u>	
I I BEREN ATTOM TO THE	. ,	1 ADI 614			manu.	~~!UIST		

O PUMP MFR. O DRIVER MFR. O DRIVER MFR. GLAND TYPE/MAT'L _

BY MFR./PURCHASER

MODEL

MFR. CODE

GLAND PLATE TAPS REQUIRED FOR:

O CAFTRIDGE TYPE REQUIRED

O QUENCH O FLUSH O DRAIN O VENT

MANUFACTURER

O BY PURCHASER

DRIVER HALF-COUPLING MOUNTED BY:

TYPE/MODEL_

GREASE RING OIL OIL MIST

FLOOD FLINGER PRESSURE

			ATTACH	MENT	_A				
FLUOR	DANIEL		NO. BY		REVISK	ION		B-DS-2	REV.
5	DATA S	HEET	Ď				DATE 08-29-		845734
U.S. Dep	partment of El Waste Vitrific	nergy					TAG NO.	PX-580-	
Richland,	l. Washington	n	 				SPECIFICAL		
DOE Cor	ntract DE-AC	06-86RL10838	, 📉				FOR CLIENT U	1513: USE	9
AIR DR	IVEN DIAP	PHRAGM PUR	MPS A				ORIG BY	CHKD	APPR'D
							M. Feldon	1	1 -
	with OEM	- Contact and Atlanta							<u> </u>
	SAMPLE PLIMP (PRO		SHEETS: <i>P33B - 15139</i> AIR DRIVEN 1	1		T			
	FANT SLUTTRY FEED TO		<u></u>	1 PX-580-004		7.7713	PUMP M		
PUMP MFR					UMP (PROCESS FRIT)	CASING IMPELLER		1 <u>01 S.S.</u>	
SIZE & TYPE				SAMPLE PL SLUPPRY FE		IMPELLER INTERNAL PARTS		16L S.S.	
				NIA	BU OFFI	NO. PUMPS REQ			
SERIAL NO.		· · · · · · · · · · · · · · · · · · ·	·	nya Nya		NO. PUMPS REQ NO. TURBINE DR			
	UQUID		OPERATING			T			
NAME:	60% GLASS	- CD17 MJ	CAPACITY (U.S. GPM):	CUra	NS	TEMP (°F):	MAX. 104		MIN. 80
PARTIE.	1.5% FORMIC		NORMAL 7	PATED .	_ !	TEMP: (%): REL. HUMID: (%):			MIN. <u>60</u> MIN.
PUMPING TEMPER		Penne	DISCHARGE PRESSURE (PSIG)			ALTITUDE (FEET)			Min.
	7 MAX10-	24 MIN	SUCTION PRESSURE (PSIG):	P		& INDOOR		HEATED	() ROOF
	(: @ <u>77</u>		·	RATED	- 4	I -	г сол		O ROOF
	SIA): 0.5		DIFFERENTIAL PRESSURE (PSI			AREA CLASSIFIC	-		U 1
	7		DIFFERENTIAL HEAD (FEET)			OTHER:			
	SION CAUSED BY:		NPSH AVAILABLE (FEET):			REMARKS:		NT AIR AVAIL	ARI E AT
	FORMIC ACE		HYDRAULIC POWER (HP):				100 /		
REMARKS:									
· · · · · · · · · · · · · · · · · · ·			PEFFORMANCE (TO BE COMP	PLETED 8	Y MANUFACTURET)				
PROPOSAL CURVE	E NO.:		MINIMUM CONTINUOUS FLOW			NPSH REQUIRED	FEET WATE		
SPEED (RPM):			THERMAL		BLE	i	•	•	
EFFICIENCY (%):			MAX. HEAD PATED IMP. (FEET):		/	SUCTION SPECIF			
RATED POWER (BH	1P):		MAX. POWER RATED IMP. (BHP	P):		1			···
		COME	STRUCTION (TO BE COMPLETED B	BY PURCH	MANUFAC	MURER	:		
	F	-Wio	AFR	Ā					Υ
NOZZLES	9tZE	PATING	SIZE		RATING	MISC. CONNECT	1ONS	80ZE	TYPE
SUCTION	1/2	MPT (F)	1/2*		MPT (F)	DRAIN		r	MPT(F)
DISCHARGE	r	NPT (F)	3/4		MPT (F)	VENT		1/2"	MPT(F)
CASING MOUNT:		THE DISTORE	IMPELLER DIAMETER (INCHES)		_	PRESSURE GAGE			
_	NEAR CHTRL		PATE MAX			WARM UP			<u> </u>
CASING SPLIT:		PADIAL	IMPELLER TYPE: OPEN			BALANCE			
CASING TYPE:			IMP SUCTION: SINGLE			PACKING:			<u> </u>
SINGLE VO		UBLE VOLUTE	IMP: MOUNT: BTWN. BF	AGS	OVERHUNG				
MAX. ALLOWABLE F	. ,		ROTATION (COUPLING END):	J cw	□ ccw				
	100		BEARING (TYPE/NUMBER):			SIZE/NO. RI	INGS		
	P TEMP		PADIAL		,	MECHANICAL SEAL			
HYDAO TEST PRES	SSURE (PSIG):		TRUST						
LUBRICATION TYPE		<u> </u>	COUPLING:			MANUFACTI	URER		
	RING OIL		MANUFACTURER			MODEL			
	☐ FUNGER ☐		TYPE/MODEL			MFR. CODE	i		_
REMARKS:			DRIVER HALF-COUPLING MOUNT			O CARTE	RIDGE TYPE RI	EQUIRED	
			O PUMP MFR. O DRIVER	.A MFR.	O DRIVER MFR.	GLAND TYPE/MAT'L	L		
						GLAND PLATE TAPS			
			O BY PURCHASER	BY M	FR./PURCHASER (O QUENCH C) FLUSH	O DRAIN	O VENT

			ATTACHI	MENT A									
ELLIO	R DANIEL	-	NO. BY	PIEVISI	SHE	ET NO.	REV.						
TEOO!	R DANIEL		DATE	reyis:		P338-DS-3	ONTRACT						
	DATA S	HEET				08-29-88 CONTRAC							
					TAG	NO.							
U.S. Depa	artment of Er	nergy	^		CDE	PX-580- CIFICATION SECT NO							
Hantord \	Naste Vitrific Washington	ation Plant	[]		s-c		_						
DOE Con	tract DE-AC	06-86RL10838			FOR	1513 CLIENT USE	.						
AIR DR	IVEN DIAP	HRAGM PUN	ars 📉		1	G BY CHK'D	APPR'D						
			/\		<u>M.</u>	Feldon RMI	<i>a</i>						
				- ···									
			HEETS: P339 - 15139		·								
SERVICE	FSFT RECEICULATION	ON PUMP	AIR DRIVEN 1			PUMP MATERIALS							
	·			(580-005	CASING	2.2 1516							
		 	<u>D</u>	RSFT RECERCULATION PLANP	IMPELLER								
					INTERNAL PARTS	316L S.S.							
NO STAGES			MOTOR TAG NO.	<u> </u>	NO. PUMPS REQ	1							
SERIAL NO.			MOTOR PROVIDED BY	и	NO. TURBINE DRIVEN	·							
	FIGUE		OPERATING O	CONDITIONS		BITE CONDITIONS							
NAME:	#% QLASS FI	RIT IN WATER	CAPACITY (U.S. GPM):		TEMP ("F): MA	x	MIN.						
	AND FORMIC	ACID; pH-2	NORMAL #5	RATED	REL HUMID: (%): MAX. MIN.								
PUMPING TEMPER	ATURE (*F):		DISCHARGE PRESSURE (PSIG)	43.5	ALTITUDE (FEET):								
NORMAL 27	MAX. 10	€ MIN.	SUCTION PRESSURE (PSIG):		Ø INDOOR Ø HEATED ○ ROOF								
SPECIFIC GRAVITY	@		MAX	RATED	O INDOOR	O HEATED	O ROOF						
VAPOR PRESS. (PS	(A): 0.5		DIFFERENTIAL PRESSURE (PSI)):	AREA CLASSIFICATION: 3								
VISCOSITY (CP): @		年= 1.1	DIFFERENTIAL HEAD (FEET)	103	OTHER:								
	ION CAUSED BY:		NPSH AVAILABLE (FEET):		REMARKS:	PLANT AR AWA	ABLE AT						
	FORMIC ACE		HYDRAUUC POWER (HP):	· · ·	,	100 PSIG							
REMARKS:													
·····		· · · · · · · · · · · · · · · · · · ·	PERFORMANCE (TO BE COMP	LETED BY MANUFACTURER									
PROPOSAL CURVE	NO.:		MINIMUM CONTINUOUS FLOW	·	NPSH REQUIRED (FEET WATER):								
SPEED (RPM):		· ····································	THERMAL		■								
EFFICIENCY (%):			MAX. HEAD RATED IMP. (FEET):		SUCTION SPECIFIED SPEED:								
PATED POWER (BI			MAX. POWER RATED IMP. (BHP)		SOCTION SPECIFIED	SPEED.							
TOTAL OF THE REPORT OF					<u> </u>								
		LUED	TRUCTION (TO SE COMPLETED B		AUTEN .								
NOZZLES	802E	RATING	SIZE	RATING	MISC. CONNECTIONS	S SIZ E	TYPE						
SUCTION	2	MPT (F)	1/2	NET (F)	DRAIN	r	MPT(F)						
DISCHARGE	2	MPT (F)	3/4	MPT (F)	VENT	1/2	MPT(F)						
CASING MOUNT:	T FOOT	BRACKET	IMPELLER DIAMETER (INCHES)		PRESSURE GAGE		 						
	I NEAR CNTRL	_	PATE MAX.	MIN	WARM UP	╁							
CASING SPLIT:		☐ RADIAL	IMPELLER TYPE: OPEN	☐ CLOSED	BALANCE								
CASING TYPE:	_	STAGGERED	IMP SUCTION: SINGLE		PACKING:								
CASING TYPE: U				DOUBLE		-R							
MAX. ALLOWABLE I		JBLE VOLUTE	IMP MOUNT: BETWN. BE		MANUFACTURER								
	100		ROTATION (COUPLING END): EBEARING (TYPE/NUMBER):]ow □ cow	TYPE								
·				AMA	SIZE/NO. PINGS								
	TEMP: SURE (PSIG):		RADIALTRUST	<u>N/A</u>	MECHANICAL SEAL:								
			COUPLING:		API CLASS CODE								
LUBRICATION TYPE		J API 614	MANUFACTURER	MA									
ILLIG-R€ASE	RING OIL	LI OIL MIST		AyA	MODEL								

O PUMP MFR. O DRIVER MFR. O DRIVER MFR. GLAND TYPE/MATIL.

BY MFR./PURCHASER

MFR. CODE

GLAND PLATE TAPS REQUIRED FOR:

O CARTRIDGE TYPE REQUIRED

O QUENCH O FLUSH O DRAIN O VENT

TYPE/MODEL_

O BY PURCHASER

DRIVER HALF-COUPLING MOUNTED BY:

☐ FLOOD ☐ FLINGER ☐ PRESSURE

												
FLUOR DANIEL			NO. BY	FIEVE	SION	P338-DS-4	REV.					
5	DATA S	HEET	<u>Α</u>			08-29-88	CONTRACT 845734					
U.S. Dep	artment of E	nergy	K.			IG NO. PX-580	¥006					
Hanford \	Waste Vitrific , Washingtor	cation Plant			SP SP	PECIFICATION SECT N	40.					
DOE Cor	ntract DE-AC	06-86RL10838	, 4		FC	751. OR CLIENT USE	39					
		HRAGM PUR										
						RIG BY CHK'D II. Feldon RM	APPR'D					
		EPAL SPECIFICATION S	SHEETS: P338 - 15139									
	SAMPLE PUMP TAMBNATION FRIT SU	LURRY FEED TANKS	AIR DRIVEN 1 PUMP TAG NO. PX-580	- And		PLANP MATERIALS						
		DANT FEED DANKY			_ CASING IMPELLER	31@L S.S.						
SIZE & TYPE			AED I		INTERNAL PARTS	22 2016						
			MOTOR TAG NO. SAME		NO. PUMPS REQ	1						
SERIAL NO.			MOTOR PROVIDED BY MANUE	ACTURER	NO. TURBINE DRIVE							
	LIQUID		OPERATING CONE	XTIONS		SITE CONDITIONS						
NAME:	#% GLASS F		CAPACITY (U.S. GPM):		TEMP: (°F): MAX. 104 MIN. 60							
	1.5% FORMSC	ACED	· · · · —-	ED	REL HUMID. (%): MAX MIN							
PUMPING TEMPER			DISCHARGE PRESSURE (PSIG);	25	_ ALTITUDE (FEET):							
	7 MAX. <u>10</u> ': @ <u>77</u>		SUCTION PRESSURE (PSIG): MAX RATI	<u>-</u>	(\$ INDOOR (\$ HEATED () ROOF							
	SIA): 0.5		DIFFERENTIAL PRESSURE (PSI):		_ O INDOOR O HEATED O ROOF _ AREA CLASSIFICATION: 3							
	77		DIFFERENTIAL HEAD (FEET)		OTHER:							
	BION CAUSED BY:		NPSH AVAILABLE (FEET):			FLANT AR ANA	ABLE AT					
	FORMIC ACE		HYDRAULIC POWER (HP):			100 PSIG						
REMARKS:												
		<u></u>	PERFORMANCE (TO BE COMPLETE	D BY MANUFACTURES								
	NO.:		MINIMUM CONTINUOUS FLOW (GPN	•	NPSH REQUIRED (F	•						
SPEED (RPM):				STABLE		DP						
EFFICIENCY (%):			MAX. HEAD RATED IMP. (FEET):		SUCTION SPECIFIED	D SPEED:						
RATED POWER (BI	(P):	COME	MAX. POWER RATED IMR (BHP):		-							
	F	ZUID CONS	TRUCTION (TO BE COMPLETED BY PU AIR	ALTHARITY AND INCOME.	CTURES	· · · · · · · · · · · · · · · · · · ·	1					
MO229.E98	80ZE	RATING	SIZE SIZE	FATING	MESC. CONNECTION	VS 802E	TYPE					
SUCTION	1/2	MPT (F)	1/2"	MPT (P)	DRAIN	r r	NPT(F)					
DISCHARGE	r	MPT (F)	3/F	MPT (F)	VENT	1/2	MPT(F)					
CASING MOUNT:	Tecot	☐ BRACKET	IMPELLER DIAMETER (INCHES)		PRESSURE GAGE							
												
CENTERLINE [NEAR COTTRL	INLINE	PATE MAX	MIN	WARM UP							
CENTERLINE [NEAR CNTRL	INLINE PADIAL	IMPELLER TYPE: OPEN	CLOSED	BALANCE							
CENTERLINE CASING SPLIT: CASING TYPE:	NEAR CNTRL AXIAL DIFFUSER	☐ INLINE ☐ RADIAL ☐ STAGGERED	MPELLER TYPE: OPEN MP. SUCTION: SINGLE	CLOSED DOUBLE	BALANCE PACKING:							
CENTERLINE CASING SPLIT: CASING TYPE: CASING	NEAR CNTRL AXIAL DIFFUSER DUTE DOC	INLINE RADIAL STAGGERED UBLE VOLUTE	IMPELLER TYPE: OPEN IMP. SUCTION: SINGLE IMP. MOUNT: BTWN. BRGS	CLOSED DOUBLE OVERHUNG	BALANCE PACKING: MANUFACTUR	DER						
CENTERLINE CASING SPLIT: CASING TYPE: COMMANDE VO	NEAR CNTRL AXIAL DIFFUSER DUTE DOC	INLINE PADIAL STAGGERED UBLE VOLUTE	MPELLER TYPE: OPEN MP. SUCTION: SINGLE	CLOSED DOUBLE OVERHUNG	BALANCE PACKING: MANUFACTUR TYPE							
CENTERLINE I CASING SPLIT: [CASING TYPE: [SINGLE VO MAX. ALLOWABLE H AT 60*F	NEAR CNTRL AXIAL DIFFUSER DILUTE DOL PRESSURE (PSIG):	INLINE RADIAL STAGGERED UBLE VOLUTE	MPELLER TYPE: OPEN IMP. SUCTION: SINGLE IMP. MOUNT: BTWN. BRGS ROTATION (COUPLING END): CW BEARING (TYPE/NUMBER):	CLOSED COUBLE COVERHUNG COW	BALANCE PACKING: MANUFACTUR TYPE							
CENTERLINE CASING SPLIT: CASING TYPE: CASING	NEAR CNTRL AXIAL DIFFUSER DUTE DOL DRESSURE (PSIG): 100	INLINE RADIAL STAGGERED UBLE VOLUTE	MPELLER TYPE: OPEN IMP. SUCTION: SINGLE IMP. MOUNT: BTWN. BRGS ROTATION (COUPLING END): CW BEARING (TYPE/NUMBER):	CLOSED DOUBLE OVERHUNG	BALANCE PACKING: MANUFACTUR TYPE SIZE/NO. RING MECHANICAL SEAL:							
CENTERLINE CASING SPLIT: CASING TYPE: CASING	NEAR CNTRL AXIAL DIFFUSER DULTE DOX PRESSURE (PSIG): 100 PTEMP: SSURE (PSIG):	INLINE PADIAL STAGGERED UBLE VOLUTE	IMPELLER TYPE: OPEN IMP. SUCTION: SINGLE IMP. MOUNT: BTWN. BRGS ROTATION (COUPLING END): CW BEARING (TYPE/NUMBER): RADIAL	CLOSED COUBLE COVERHUNG COW	BALANCE PACKING: MANUFACTUR TYPE SIZE/NO. RING MECHANICAL SEAL: API CLASS CO							
CENTERLINE CASING SPLIT: CASING TYPE: CASING	NEAR CNTRL AXIAL DIFFUSER DUITE DOU PRESSURE (PSIG): 100 TEMP: SSURE (PSIG): FING OIL	INLINE RADIAL STAGGERED UBLE VOLUTE 150 API 814 OIL MIST	MPELLER TYPE: OPEN IMP. SUCTION: SINGLE IMP. MOUNT: BTWN. BRGS ROTATION (COUPLING END): CW BEARING (TYPE/NUMBER): RADIAL TRUST	CLOSED COUBLE COVERHUNG COW	BALANCE PACKING: MANUFACTURE TYPE SIZE/NO. PING MECHANICAL SEAL: API CLASS COMMANUFACTURE	DE						
CENTERLINE CASING SPLIT: CASING TYPE: CASING	NEAR CNTRL AXIAL DIFFUSER DUTE DOU PRESSURE (PSIG): 100 TEMP. SSURE (PSIG): HING OIL FUNGER	INLINE RADUAL STAGGERED UBLE VOLUTE 150 API 814 COL MIST PRESSURE	IMPELLER TYPE: OPEN IMP. SUCTION: SINGLE IMP. MOUNT: STWN. BRGS ROTATION (COUPLING END): CW BEARING (TYPE/NUMBER): FADIAL TRUST COUPLING:	CLOSED DOUBLE OVERHUNG CCW	BALANCE PACKING: MANUFACTURE TYPE SIZE/NO. PING MECHANICAL SEAL: API CLASS COMMANUFACTURE	DE						
CENTERLINE CASING SPLIT: CASING TYPE: CASING	NEAR CNTRL AXIAL DIFFUSER DUITE DOU PRESSURE (PSIG): 100 TEMP: SSURE (PSIG): FING OIL	INLINE RADUAL STAGGERED UBLE VOLUTE 150 API 814 COL MIST PRESSURE	MPELLER TYPE: OPEN MR. SUCTION: SINGLE IMP. MOUNT: BTWN. BRGS ROTATION (COUPLING END): CW BEARING (TYPE/NUMBER): FADIAL TRUST COUPLING: MANUFACTURER TYPE/MODEL DRIVER HALF-COUPLING MOUNTED E	CLOSED DOUBLE CVERHUNG COW	BALANCE PACKING: MANUFACTUR TYPE SIZE/NO. RING MECHANICAL SEAL: API CLASS COI MANUFACTURE MODEL MFR. CODE CARTRID	DE						
CENTERLINE CASING SPLIT: CASING TYPE: CASING	NEAR CNTRL AXIAL DIFFUSER DUTE DOU PRESSURE (PSIG): 100 TEMP. SSURE (PSIG): HING OIL FUNGER	INLINE RADUAL STAGGERED UBLE VOLUTE 150 API 814 COL MIST PRESSURE	MPELLER TYPE: OPEN IMP. SUCTION: SINGLE IMP. MOUNT: BTWN. BRGS ROTATION (COUPLING END): CW BEARING (TYPE/NUMBER): RADIAL	CLOSED DOUBLE CVERHUNG COW	BALANCE PACKING: MANUFACTUR TYPE SIZE/NO. RING MECHANICAL SEAL: API CLASS COI MANUFACTUR MODEL MFR. CODE CARTRID GLAND TYPE/MATIL	DE ER IGE TYPE REQUIRED						
CENTERLINE CASING SPLIT: CASING TYPE: CASING	NEAR CNTRL AXIAL DIFFUSER DUTE DOU PRESSURE (PSIG): 100 TEMP. SSURE (PSIG): HING OIL FUNGER	INLINE RADUAL STAGGERED UBLE VOLUTE 150 API 814 COL MIST PRESSURE	MPELLER TYPE: OPEN IMP. SUCTION: SINGLE IMP. MOUNT: SINGLE IMP. MOUNT: SINGLE IMP. MOUNT: SINGLE IMP. MOUNT: METWN. BRGS ROTATION (COUPLING END): CW BEARING (TYPE/NUMBER): RADIAL TRUST COUPLING: MANUFACTURER TYPE/MODEL DRIVER HALF-COUPLING MOUNTED E O PUMP MFR. O DRIVER MFR	CLOSED DOUBLE CVERHUNG COW	BALANCE PACKING: MANUFACTUR TYPE SIZE/NO. RING MECHANICAL SEAL: API CLASS COI MANUFACTURI MODEL MFR. CODE C CARTRID	DE DE DE TYPE REQUIRED REQUIRED FOR:						

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

Rev. 0

ATTACHMENT B EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

		RAXIBAD	I ENVELOPE (i	nches)
TAG NUMBER	NOOEL NUMBER*	LENGTH	WIDTH	HEIGHT
PX-580-003	Warren Rupp Sandpiper EB2-A Type TN-2-SS	13	19	23
PX-580-004	Warren Rupp Sandpiper EB1/2-A Type TN-2-SS	9.5	7	11
PX-580-005	Warren Rupp Sandpiper EB2-A Type TN-2-SS	13	19	23
PX-580-006	Warren Rupp Sandpiper EB1/2-A Type TN-2-SS	9.5	7	11

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 15141 CENTRIFUGAL PUMPS B-595-P-P33B-15141

APPROVED FOR CONSTRUCTION

REVISION ISSUE DATE

0 2-2-93 WAPA YES ___ NO X QUALITY LEVEL I __ II X SAFETY CLASS 1_ 2_ 3_X 4_

ORIGINATOR:

CHECKER:

J. J. Ichkhan, Mechanica'l Eng.

Date

APPROVED BY:

C. J. Divona

Lead Discipline Engineer

1-26-93

Date

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

Rev. 0

SECTION 15141 CENTRIFUGAL PUMPS B-595-P-P33B-15141

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SECTION 15141 CENTRIFUGAL PUMPS

PART 1 GENERAL

1.1 SUMMARY

This specification section covers the technical requirements for the design, fabrication, inspection and testing of centrifugal pumps.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.5

1988 Pipe Flanges and Flanged Fittings

AMERICAN PETROLEUM INSTITUTE (API)

API 610

1989 Centrifugal Pumps for General Refinery Services, 7th Edition

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
Boiler and Pressure Vessel Code

ASME Section VIII, Division 1

1989 Rules for Construction of Pressure

Vessels

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1

1990 Structural Welding Code Steel, 12th

Edition

ANTIFRICTION BEARING MANUFACTURERS ASSOCIATION (AFBMA)

AFBMA 9

1990 Edition - Load Ratings and Fatigue

Life for Ball Bearings

AFBMA 11

1990 Edition - Load Ratings and Fatigue

Life for Roller Bearings

HYDRAULIC INSTITUTE (HI)

HI

1983 Standards for Centrifugal, Rotary and

Reciprocating Pumps, 14th Edition

INSTRUMENT SOCIETY OF AMERICA (ISA)

ISA S20

1981 Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA Standard

1978 Guards for Rotating Equipment

Instruction 1-12.14

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-6

1989 Surface Preparation Specification No. 6, Commercial Blast Cleaning

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

Specification Section 15196 Identification and Tagging Methods

for Mechanical Equipment

Specification Section 16150 Motors - Induction for General

Service

1.4 DEFINITIONS

FAT - Factory Acceptance Test

NPSH - Net Positive Suction Head

TEFC - Totally Enclosed Fan Cooled

1.5 SYSTEM DESCRIPTION

(Not Used)

· 1 ·

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 Drawings

1.6.1.1 A. Certified dimensional outline drawings shall be submitted for Buyer approval. These drawings shall include dimensions, shipping weights, operating weights and clearances to be maintained. They shall also show design temperatures and pressures, operating temperatures and pressures, size and location of all connections, lifting

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supports, materials of construction and corrosion allowances. Drawings which include the base frame shall include base plate thickness at the foundation bolts, location of anchor bolts and size of control panel fasteners.

- B. Sectional drawings shall be submitted for Buyer approval. These drawings shall show inside arrangement construction and details for each component.
- C. The allowable loads on both the pump discharge nozzles and suction nozzles shall be furnished for Buyer approval.

All drawings shall include a detailed bill of materials. This bill shall list the manufacturer, type and ratings of all component parts or assemblies.

- 1.6.1.2 Ratings in HP for the fully-installed pump drive motor shall be supplied.
- 1.6.2 Technical Data
- 1.6.2.1 Design Calculations Engineering design analysis with supporting calculations used to establish connected horsepower requirements, shaft sizes, bearing loads and operating characteristics. Calculations shall be complete and in sufficient detail to permit a second party review.
- 1.6.2.2 Descriptive Literature Descriptive literature including equipment ratings, model numbers, operating characteristics and technical descriptions.
- 1.6.2.3 Data Sheets
 - A. Completed data sheets as indicated in P33B-DS-1 and DS-2 (Attachment A).
 - B. Complete ISA S20 specification forms for process measurement and control instruments, primary elements and control valves.
- 1.6.2.4 Pump Performance Curves Pump performance curves shall be provided. Curves shall include pump brake horsepower, efficiency, Net Positive Suction Head (NPSH) required, viscosity and specific gravity corrections.
- 1.6.2.5 Nozzle loadings in accordance with Paragraph 2.4 and Table 2 of API 610.
- 1.6.2.6 Factory Acceptance Tests (FATs) as defined in Paragraph 2.4.2.

1.6.3 Spare Parts List

A list of recommended spare parts for one (1) year's routine operation shall be supplied. The spare parts list shall include sufficient data to permit procurement from the original manufacturer or any subsupplier.

1.6.4 Installation, Operation and Maintenance Manuals

Seller shall provide operation and maintenance manuals. These shall cover the centrifugal pumps furnished in accordance with this specification section. The manuals shall fully detail sequences of disassembly, repair, adjustment, reassembly, lubrication and troubleshooting. Troubleshooting sections shall include fault trees to guide both mechanical and electrical diagnostics. Reduced-size copies of any assembly drawing, sub-assembly drawing and parts list needed for routine maintenance and overhaul shall be included. This data shall be submitted in accordance with Specification Section 01730. Complete installation manuals shall also be submitted.

1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

3)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

Α.	Site	Elevation	714 feet above sea level								
В.	Baro	metric Pressure	14.3 psia								
C.	Outs	ide Design Temperature									
	1)	Maximum Design Temperature	110°F								
	2)	Minimum Design Temperature	-20°F								
	3)	Wet Bulb Design Temperature	68°F								
D.	0per	ating Environment									
	1)	Normal Temperature	60°F to 104°F								
	2)	Maximum Temperature	104°F								

Not controlled

Relative Humidity

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

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PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General Requirements

Centrifugal pumps shall be furnished by a manufacturer normally engaged in the production of industrial centrifugal pumps. Pumps furnished in accordance with this specification section shall be centrifugal pumps designed and constructed in accordance with the requirements of both API 610 and the HI standard for the intended service.

All exposed moving parts shall have heavy-duty, removable guards provided in accordance with OSHA Standard Instruction 1-12.14.

Seller shall be responsible for the design, selection and performance of the pumps.

2.1.2 Baseplates and Supports

A fabricated steel drive baseplate shall be furnished. This baseplate shall be designed such that all equipment and auxiliary piping are located within its confines. It shall be rigid enough to maintain pump machinery alignment during shipping. The baseplate for the pump furnished shall be in accordance with API 610, Paragraph 3.3. It shall be Type 304L stainless steel.

Lifting lugs or other arrangements shall be provided for hoisting and handling the assembled unit during field erection.

- A. Pump and motor support pads shall be machined flat and in the same plane within 0.002 inch per foot between pads.
- B. Motor support pads shall be machined to provide a minimum of 3/16 inch shim height.
- C. That portion of the drive base under the pump shall have a drain pan with raised lip construction. The drain pan shall have a threaded connection at the pump outboard end.
- D. Shaft centerlines shall be of sufficient height above the baseplate to permit the piping of all auxiliary connections.
- E. No component of the unit except the motor conduit box shall overhang the drained baseplate.
- F. Baseplate shall be in accordance with API 610 Baseplate Numbers 0.5-12. The holes shall be 3/16 inch larger than the required bolt size.

1 .

- G. Anchor bolt size shall be not less than 3/4 inch diameter.
- H. Pipe supports shall provide piping flexibility and accessibility necessary for proper operation and maintenance.
- I. Flanges shall be in accordance with ANSI B16.5.
- 2.1.3 Maximum envelope sizes and model numbers of equipment or equal are illustrated in Attachment B.

2.2 FABRICATION AND MANUFACTURE

2.2.1 General Requirements

The pump operating point shall be within 10 percent of the peak efficiency on the pump performance curve. At design conditions and at maximum horsepower along the pump curve, the horsepower requirements shall not exceed the nominal rating of the motor as shown on the nameplate (excluding service factor).

All rotating parts of the assembled equipment shall operate throughout the required range without excessive vibration, or noise. The noise level shall not exceed 85 dB at 3 feet peripheral around the pump skid.

2.2.2 Pump Casing

5/907 2023 16/2

Pump casings shall be designed for the maximum discharge pressure at pumping temperature and hydrostatic test pressure at ambient temperature. Materials, casting factors and the quality of any welding shall be in accordance with ASME Section VIII, Division 1. The pump must come with a casing vent. Code stamp and data report forms are not required.

2.2.3 Materials

Pump casing material shall be in accordance with API 610, Class A-7, Table H-1. The material shall be identified in accordance with this standard. Bearings, shafts and grease-lubricated seals shall be manufacturer's standard for the intended service.

Castings shall be sound. No shrink, blow holes, scale, blisters or other defects shall be permitted. Surfaces shall be cleaned by manufacturer's standard methods. All casting burrs shall be filed or ground flush with the casting surface. The use of plastic or cement compounds to repair leaks and defects in pressure casings shall not be permitted.

2.2.4 Bearings

Bearings shall be sized to take the thrust loads of 150 percent of rated capacity at maximum speed. The life for antifriction bearings specified therein shall be L-10 of 100,000 hours service life calculated in accordance both with AFBMA 9 and AFBMA 11.

2.2.5 Vibration

Major rotating components such as impellers and balancing drums shall be dynamically balanced in accordance with API 610, Paragraph 2.8.4. Peak-to-peak vibration limits shall apply to all pumps. These limits shall cover rotor vibration during shop and field tests at rated speed and throughout the full operating capacity. Peak-to-peak limits measured on the shaft are:

Speed (rpm)
1800 and below

Anti-Friction
Bearings(1)
1.5 mils

(1) Measured on bearing housing

2.2.6 Coupling

Pump manufacturer shall mount pump and motor half couplings. Couplings shall be rated for a minimum of 150 percent of motor nameplate horsepower at design rpm. All metal flexible coupling shall be keyed to both shafts. Couplings and guards shall be in accordance with API 610, Paragraph 3.2. The coupling material shall be compatible with the material of the equipment shaft.

2.2.7 Safety Guarding

All safety guards, color coding, signs, accessibility, etc., shall be in accordance with OSHA Standard Instruction 1-12.14. Safety guards shall be designed such that the guarded equipment is easily accessible for maintenance.

2.2.8 Electrical Requirements

Motors shall be integral, foot-mounted, totally enclosed fan cooled (TEFC), squirrel-cage, induction type. They shall have normal starting and breakdown torque. Motors shall be in accordance with Specification Section 16150 except as modified herein.

2.2.9 Coatings

After completion of all fabrication procedures the external surfaces of each pump shall be thoroughly cleaned of all foreign materials, including rust, in accordance with SSPC SP-6.

Manufacturer's standard prime and finish paint or coatings shall be applied. Stainless steel, nickel, brass, copper, monel, aluminum, hastelloy, lead, galvanized steel, plastics, elastomers and glass surfaces shall not be painted unless specified otherwise.

2.2.10 Welding

All pump unit assembly welding requirements shall be in accordance with API 610 Paragraph 2.11.3 standard practice.

Baseplate and support welding requirements shall be in accordance with AWS D1.1.

2.3 LABELING

Labeling and tagging shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6. This shall be in addition to the manufacturer's identification plate.

2.4 INSPECTION AND TESTING

2.4.1 Inspection and testing shall be in accordance with API 610 Paragraphs 4.1, 4.2 and 4.3.

2.4.2 Factory Acceptance Tests (FATs)

- A. Seller shall shop-test the unit to verify pump performance. A detailed shop testing procedure shall be submitted for Buyer approval prior to testing. Buyer shall be notified in advance of all source testing and shall be allowed to witness all tests (FATs).
- B. Pump shall be tested at the factory to provide detailed performance data and demonstrate conformance to specifications. The pump shall be hydrostatically tested for a period of time not less than 30 minutes. The test pressure shall be not less than one and one-half times the head capabilities of the maximum diameter impeller for the casing at shutoff, plus the pump maximum allowable suction head. In no case shall the test pressure be less than 250 psig. Pump casing shall be tight at the test pressure. During the test, no visible leakage shall occur at any joint.
- C. Seller shall furnish certified shop test curves and FAT reports. They shall show head-capacity, efficiency and brake horsepower of the pump in accordance with API 610 Paragraph 5.2.4.

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2.5 **PACKAGING**

Packaging and preparation for shipment shall be in accordance with Seller's standards. At minimum, protection shall be provided against corrosion and damage during normal handling, shipping and storage. Minimum preparation shall include the requirements listed below.

- 2.5.1 Machined surfaces, threads, bearings and bearing housings shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- 2.5.2 Flanged openings shall be covered with wood or plastic protectors. Protectors shall be installed with not less than four (4) full diameter steel bolts and nuts of compatible material with the flange.
- 2.5.3 Threaded connections and tapped holes shall be capped or plugged. Compatible materials shall be used to prevent thread damage.
- 2.5.4 Pump Unit Assemblies shall be shipped fully assembled on baseplate.
- 2.5.5 Bracing, supports and rigging connections shall be provided to prevent damage during shipment, lifting and unloading.
- 2.5.6 Separate or loose parts shall be boxed. The box shall be attached to the main item to be shipped as a unit.

All shipping containers shall be identified by Seller's order number, equipment number and equipment description.

PART 3 EXECUTION

(Not Used)

END OF SECTION

ATTACHMENT A

				NO.	BY DATE	REVIS	ION	SHEET NO.	ł	REV.		
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	tract DE-AC06-8	6RL10838	}	\			 _	FOR CLIENT USE	5141	····		
								ORIG BY TO	энко Т	APPR'D		
CEI	NTRIFUGAL PUI	APS		<u> </u>				S. Streumburg	KJM	AFFRU		
	COMPLY WITH GEN		IFICATIO	N SHEET	S: H-2	123354-1 (SS 151	41)					
Service — PR	OCESS COOLING V	ATERN	o. Motor	Driven _	_ 2			PUMP MATER	MLS			
		P	ump Tag	No.	X 450-001	<u> </u>	Casing	304L SS				
Pump Mfr	 			_	PX-450-001	8	Impeller	mpeller 304L \$\$				
Size & Type			PROC	ESS COO	LING WATI	ER PUMP	Internal Par	s		 -		
No. Stages		<u> </u>	lotor Tag	No\$	AME		No. Pumps	Req				
Serial No	· · · · · · · · · · · · · · · · · · ·	м	lotor Pro	vided By .	MANU	FACTURER	No. Turbine	Driven				
	LIQUID			OPERAT	NG CONE	ITIONS		SITE CONDITI	ONS			
Name WATER			apacity	(U.S. GPM			Temp. (°F):	Max				
Pumping Temperat	Pumping Temperature (°F):				Rat	ed	Rel. Humid.	(%): Max	Min			
Normal80_		ischarge	Pressure	(PSIG): _		Altitude (Fed	Rel. Humid. (%); Max Min Attitude (Feet):					
Specific Gravity: @	s	uction P	ressure (P	SIG):		O Indoo	or O Heated	l () Ro	of			
Vapor Press. (PSIA)					od	Oortq	oor OUnhea	ted 🔾 Su	n			
Viscosity (CP): @ .					70.6	Area Classif	ication:					
Corrosion/Erosion					58.6	Other:						
_NITRIC ACID DEC	CONTAMINATION	N	IPSH Av	ailable (Fe	et):	<u> </u>	Remarks:	OPERATING, 1	SPARE			
Remarks:		\н	lydr <u>auli</u> c	Power (H	P): <u>82</u>	<u> </u>	400 GPM M	<u>INIMUM FLOW (E</u>	STIMATE	D)		
·		PER	FORMA	NCE (To E	e Comple	ted By Manufactur	er)	<u> </u>				
Proposal Curve No).:	M	linimum	Continuo	ıs Flow (G	PM):	NPSH Requ	NPSH Required (Feet Water):				
Speed (RPM):			Therma	l	Stable	· ————	3% Head Drop					
Efficiency (%):		M	lax, Hea	d Rated In	np. (Feet):		Suction Specified Speed:					
Rated Power (BHP)):	M	lax. Pow	er Rated I	mp. (BHP)	:						
		CONSTRUC	том (т	Be Com	pleted By I	Purchaser and Ma	nufacturer)					
NOZZLES	SIZE	RATIN	G	FAC	NG	LOCATION	₹ ├ ──	CONNECTIONS	SIZE	TYPE		
Suction			}			_ 	Dre		 -			
Discharge	- D	<u> </u>		- D'	. (Ver	ssure Gage	┽			
Casing Mount:	_	Bracket nline	•	or Diamete ed		Min		rm Up	 			
=	_	niine Radial		eo er Type:	Oper		·	ance Line				
	_	nadiai Staggered	•	uction:	☐ Singl			oking:				
Casing Type:	Double V	•	Imp. S			Brgs Double		Manufacturer				
Max. Allowable Pre		Oiul o	•			ow □ccw	'8					
	rold).			g (Type/N	•			Size/No. Rings _				
	emp		Rac	dial			Me	chanical Seal:				
Hydro Test Pressur			ust				API Class code .					
Lubrication Type:		API 614	Coupli	_			Manufacturer					
	Oil Mist					Model						
Flood C	Pressure		•	ling Mount		Mfr. Code						
			-	_	r. O Purchaser	- · · · · · ·						
			_	. •		- '''	Gland Plate Taps Required for:					
105\OS\101\204\8457194	46.001/WP51/125934:29pr	n	0	■ By Purc	haser 🔲	= By Mfr./Purcha	ser Quench O Flush O Drain O Vent					

ATTACHMENT A

	NO. BY REVISI	ION SHEET NO. REV.					
FLUOR DANIEL	DATE	P33B-DS-2 0					
DATA SHEET	 						
U.S. Department of Energy		03-19-90 845734 TAG NO PX-460-001A					
Hanford Waste Vitrification Plant		PX-460-001B					
Richland, Washington DOE Contract DE-AC06-86RL108	238	SPECIFICATION SECT NO. 15141					
	<u> </u>	FOR CLIENT USE					
CENTRIFUGAL PUMPS		ORIG BY CHK'D APPR'D					
		S. Strausburg KJM					
ALL ITEMS SHALL COMPLY WITH GENERAL SP Service MELTER COOLING WATER		£					
Service	No. Motor Driven2	PUMP MATERIALS					
	Pump Tag No. <u>PX-460-001A</u>	Casing					
Pump Mfr.	_PX-460-001B	Impeller 304/ SS					
Size & Type	·	Internal Parts 304L SS					
No Stages	MELTER COOLING WATER						
No. Stages	Motor Tag NoSAME	No. Pumps Req					
Serial No.	Motor Provided By	No. Turbine Driven					
I ACM HIS							
Name WATER	OPERATING CONDITIONS Capacity (U.S. GPM):	SITE CONDITIONS					
	Normal Rated	Temp. (°F): Max Min					
Pumping Temperature (°F):		Rel. Humid. (%): Max Min					
Normal115 Max150 Min84	Discharge Pressure (PSIG):	Altitude (Feet):					
Specific Gravity: @	Suction Pressure (PSIG):	◯ Indoor ◯ Heated ◯ Roof					
Vapor Press. (PSIA):	Max. <u>4.9</u> Rated <u>3.6</u>	Outdoor Ounheated Sun					
Viscosity (CP): @115	Differential Pressure (PSI):	Area Classification:					
Corrosion/Erosion Caused By:	Differential Head (Feet):	Other:					
NITRIC ACID DECONTAMINATION	NPSH Available (Feet):25+	Remarks: 1 OPERATING, 1 SPARE					
Remarks:	Hydraulic Power (HP):	84 GPM MINIMUM FLOW					
	ERFORMANCE (To Be Completed By Manufacture	xi)					
Proposal Curve No.:		NPSH Required (Feet Water):					
Speed (RPM):	Thermal Stable	3% Head Drop					
Efficiency (%):	Max. Head Rated Imp. (Feet):						
Rated Power (BHP):	Max. Power Rated Imp. (BHP):						
	UCTION (To Be Completed By Purchaser and Man	Machineri					
	TING FACING LOCATION	MISC. CONNECTIONS SIZE TYPE					
Suction		Drain					
Discharge		Vent					
Casing Mount: Foot Bracket	Impeller Diameter (Inches)	Pressure Gage					
Centerline Near Cntrl. Inline	Rated Max Min	Warm Up					
Casing Split: Axial Radial	Impeller Type: 🔲 Open 🔛 Closed	Balance Line					
Casing Type: Diffuser Staggered	, , , , , , , , , , , , , , , , , , , ,	Packing:					
☐ Single Volute ☐ Double Volute	Imp. Mount: Btwn. Brgs Overhung	9 Manufacturer					
Max. Allowable Pressure (PSIG): At 60°F	Rotation (Coupling End): CW CCW Bearing (Type/Number):	Type					
At Nom. Pump Temp.	Radial	Size/No. Rings Mechanical Seal:					
Hydro Test Pressure (PSIG):	Thrust	API Class code					
Lubrication Type:	Coupling:	Manufacturer					
Grease Ring Oil Oil Mist	Manufacturer	Model					
Flood Flinger Pressure	Type/Model	Mfr. Code					
Remarks:	Driver Half-Coupling Mounted By:	Clarification (Alas)					
	O Pump Mfr. O Driver Mfr. O Purchaser	Gland Type/Mat'l:: Gland Plate Taps Required for:					
105\O\$\101\207\84571949.001/WP51/125934:30pm	○ = By Purchaser □ = Bv Mfr/Purchase	haser Quench Flush Drain Vent					
	P33B - 15141	Control Origin Opinin Ovent					

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ATTACHMENT B EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

		MAXIMA	ENVELOPE	(inches)
TAG NUMBER	NODEL NUMBER*	LENGTH	WIDTH	HEIGHT
PX-450-001A	Goulds 3410M Size 8 x 10 - 14	70	34	29
PX-450-001B	Goulds 3410M Size 8 x 10 - 14	70	34	29
PX-460-001A	Goulds 3700M Size 4 x 6 - 13N	72.5	30	33 1/4
PX-460-001B	Goulds 3700M Size 4 x 6 - 13N	52	15	25

^{*}Equipment shall be of this model number or equal.

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FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 15145 SUMP PUMPS B-595-P-P33B-15145

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE $8-2-93$	WAPA YES NO _X QUALITY LEVEL I II _X SAFETY CLASS 1 2 3_X 4
ORIGINATOR: January 1/21/93 J. J. Ichkhan, Mechanical Engineer Date	CHECKER: D. A. Buzzelli Lead Disc. Checker Date
APPROVED BY:	
R.B. Erickson C. J. Divona Lead Discipline E	ngineer Date

U.S. DEPARTMENT OF ENERGY

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

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SECTION 15145 SUMP PUMPS B-595-P-P33B-15145

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SECTION 15145 SUMP PUMPS

PART 1 GENERAL

1.1 SUMMARY

This specification section covers the technical requirements for the design, fabrication, inspection and testing of sump pumps. Each pump consists of a pump, electric motor driver and coupling assembly.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B36.19M

1985 Stainless Steel Pipe

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A312/A312M

1991 Standard Specification for Seamless and Welded Austenitic

Stainless Steel Pipes

ASTM A403/A403M

1991 Standard Specification for Wrought

Austenitic Stainless Steel Piping

Fittings

ASTM A747/A747M

1989 Standard Specification for Steel

Castings, Stainless, Precipitation

Hardening

ANTI-FRICTION BEARING MANUFACTURERS ASSOCIATION (AFBMA)

AFBMA 9

1990 Load Ratings and Fatigue Life for

Ball Bearings

AFBMA 11

1990 Load Ratings and Fatigue Life for

Roller Bearings

HYDRAULIC INSTITUTE (HI)

ΗI

1983 Standard for Centrifugal, Rotary and Reciprocating Pumps, 14th Edition

714 feet above sea level

characteristics. These calculations shall be complete and in sufficient detail to permit a second party review.

- 1.6.2.2 Descriptive Literature Descriptive literature shall be provided. This literature shall include equipment ratings, model numbers, operating characteristics and technical descriptions.
- 1.6.2.3 Data Sheets Seller shall submit completed data sheets for the furnished equipment. These data sheets shall reflect the design parameters in Data Sheets DS-1 through DS-4 (Attachment A).
- Pump Performance Curves Pump performance curves as described in Paragraph 2.4 shall be provided for the pump. These curves shall include pump brake horsepower, efficiency, Net Positive Suction Head (NPSH) required, viscosity and specific gravity corrections.
- 1.6.2.5 Factory Acceptance Tests (FATs) as defined in Paragraph 2.4.
- 1.6.3 Spare Parts List

A list of recommended spare parts for one (1) year operation shall be supplied. The spare parts list shall include sufficient data to permit procurement from the original manufacturer or any subsupplier.

- 1.6.4 Operation and maintenance manuals shall be provided for the sump pumps furnished in accordance with this specification section. Manuals shall fully detail sequences of disassembly, repair, adjustment, reassembly, lubrication, and trouble-shooting. Trouble-shooting sections shall include fault trees to guide both mechanical and electrical diagnostics. Reduced-size copies of those assembly, subassembly drawings and parts lists needed for routine maintenance and overhaul shall be included. Data to be submitted in accordance with Specification Section 01730. Complete installation manuals shall also be submitted.
- 1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

Α.

- 1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS
- 1.8.1 Climatic and Geographic Site Conditions

Site Elevation

- B. Barometric Pressure 14.3 psia
- C. Outside Design Temperature
 - 1) Maximum Design Temperature 110°F

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA Standard

1978 Guards for Rotating Equipment

Instruction 1-12.14

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

Specification Section 15196 Identification and Tagging Methods

for Mechanical Equipment

Specification Section 16150 Motors - Induction for General

Service

1.4 **DEFINITIONS**

5997777

FAT - Factory Acceptance Test

NPSH - Net Positive Suction Head

TEFC - Totally Enclosed Fan Cooled

1.5 SYSTEM DESCRIPTION

(Not Used)

SUBMITTALS 1.6

Submit the following in accordance with Vendor Drawing and Data Requirements Drawings section of the Order/Subcontract.

Dimensional outline drawings showing equipment support data. 1.6.1 equipment and performance data (including performance curves) shall be submitted for Buyer approval. Drawings shall also include dimensions, shipping and operating weights, clearances which must be maintained, size and location of all connections including anchorage, lifting supports, material of construction, corrosion allowance and base frame (including its thickness). Sectional drawings showing inside construction and details for each component shall also be provided. Drawings shall include a detailed Bill of Materials listing manufacturer, type and ratings of all component parts or assemblies. The pump discharge and suction nozzle allowable loads shall be furnished with these documents.

1.6.2 Technical Data

1.6.2.1 Design Calculations - Seller shall provide engineering design analysis with supporting calculations used to establish connected horsepower requirements, shaft sizes, bearing loads and operating

2) minimum besign remperature -20 p	2)	Minimum	Design	Temperature	-20°F
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Wet Bulb Design Temperature 68°F

D. Operating Environment

1) Normal Temperature	60°F to	104°F
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2) Maximum Temperature 104°F

Relative Humidity
 Not controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General Requirements

Sump pump assemblies shall be furnished by a manufacturer normally engaged in the production of submerged sump pumps. Pumps furnished in accordance with this specification section shall be a standard production of sump pumps. Sump pump unit assembly including specified accessories, instrumentation and controls shall be designed and constructed in accordance with the requirements of the Hydraulic Institute (HI).

All exposed moving parts shall have heavy-duty, removable guards provided in accordance with OSHA Standard Instruction 1-12.14.

2.1.2 Pump Casing

Pump casing shall be 304L stainless steel in accordance with ASTM A747/A747M. The volute and discharge nozzle of the pump casing shall be cast in one piece. The casing shall be designed to withstand a hydrostatic pressure of not less than 1-1/2 times the design shutoff head of the pump.

2.1.3 Impeller

The impeller shall be 304L stainless steel in accordance with ASTM A747/A747M open type. The impeller shall be dynamically balanced.

2.1.4 Strainer

The pump intake shall be protected with a 304L stainless steel slotted intake strainer with an effective free area sufficient to prevent cavitation and degradation of efficiency. Strainer shall have a free area of at least four times the cross-sectional area of the suction casing.

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

2.1.5 Pump Shaft

Pump shaft shall be constructed of ground and polished 304L stainless steel with hardened wearing surfaces at intermediate shaft bearing locations. The mechanical properties and diameter of the shaft shall ensure that whip, deflection or vibration will not be of sufficient magnitude to impose greater than design loads on the specified shaft bearings under normal operating conditions. Means shall be provided for external adjustment of the clearance between the impeller and the inner surface of the volute.

2.1.6 Bearings and Lubrication

Ball or roller bearings shall be furnished for the motor support housing above the cover plate surface, with full provision for the mechanical and hydraulic radial and thrust loads imposed. Bearings shall be sealed and grease lubricated and shall have an L-10 rating of not less than 100,000 hours life in accordance with AFBMA 9 or AFBMA 11.

Intermediate shaft bearings shall be of the sleeve type. The center distance between any two bearings on the shaft shall not exceed 4 feet 6 inches when operating at 1750 RPM. Sleeve bearing length shall be not less than 2 times the shaft diameter. A sleeve bearing located near the lower extremity of the shaft shall be provided. Sleeve bearings shall be 304L stainless steel and provided with centralized grease lubricators manually operated from a single point.

2.1.7 Flexible Couplings

Pump shaft shall be connected to the motor shaft through a flexible coupling. The flexible coupling shall act as a dielectric connector, shall not transmit vibrations or end thrust, and shall permit up to 4 degrees misalignment under normal duty.

2.1.8 Support Pipe

A 304L stainless steel support pipe in accordance both with ASTM A312/A312M and ANSI B36.19M concentric with the pump shaft shall connect the pump to the sump cover plate. The support pipe flanges shall be machined and doweled to ensure proper alignment of the pump and shaft whenever the pipe is disassembled and reassembled in the field. The flanges shall be 304L stainless steel in accordance with ASTM A403/A403M.

2.1.9 The pump support plate shall have provisions to be anchored to the sump cover plate with a minimum of four 3/8 inch diameter bolts. Bolt holes shall be 7/16 inch diameter.

2.1.10 Discharge Pipe

A discharge pipe running from the pump discharge outlet to the sump cover plate shall be furnished as an integral part of the pump unit. The discharge pipe shall be arranged to prevent discharge piping beyond the pump assembly from imposing loads which could cause shaft misalignment. The pipe shall be 304L stainless steel in accordance both with ASTM A312/A312M and ANSI B36.19M. The discharge end of the pipe shall terminate in a 304L stainless steel flanged connection in accordance with ASTM A403/A403M.

2.2 FABRICATION AND MANUFACTURE

2.2.1 General Requirements

The pump operating point shall be within 10 percent of the peak efficiency on the pump performance curve. At design conditions and at maximum horsepower along the pump curve, the horsepower requirements shall not exceed the nominal rating of the motor as shown on the nameplate (excluding service factor). All rotating parts of the assembled equipment shall operate throughout the required range without excessive vibration, thrust, or noise. The noise level shall not exceed 85 dB at 3 feet peripheral around the pump assembly.

2.2.2 Pump Casing

Pump casing shall be designed for the maximum discharge pressure at pumping temperature and hydrostatic test pressure at ambient temperature as shown on the pump data sheet (Attachment A).

2.2.3 Materials

Pump casing shall be 304L stainless steel in accordance with ASTM A747/A747M. Impeller shall be 304L stainless steel in accordance with ASTM A747/A747M. Casting shall be sound, free from shrink or blow holes, seals, blisters and other defects. The surfaces shall be cleaned by manufacturer's standard method. All casting burrs shall be filed or ground flush with the surface of the casting. The repair of leaks and defects in pressure casings by the use of plastic or cement compounds is not acceptable.

2.2.4 Bearings

Bearings shall be sized to take the thrust loads of 150 percent of rated capacity at maximum speed. The life for antifriction bearings specified therein shall be L-10 of 100,000 hours service life calculated in accordance both with AFBMA 9 and AFBMA 11.

2.2.5 Vibration

Peak-to-peak vibration limits shall cover rotor vibration during shop and field tests at rated speed and throughout the full operating capacity. Peak-to-peak limits measured on the shaft are:

SPEED RPM	ANTIFRICTION BEARINGS (1)	SLEEVE BEARINGS (2)
1800 and below	mils 1.5	mils 1.5
(1) measured on (2) measured on	bearing housing the shaft	

2.2.6 Coupling

Pump manufacturer shall mount pump and motor half couplings. Couplings shall be rated for a minimum of 150 percent of motor nameplate horsepower at design RPM. All metal flexible couplings shall be keyed to both shafts and shall be dielectric.

2.2.7 Motor

Motor shall be vertical induction type motor, 3500 RPM Totally Enclosed Fan Cooled (TEFC), squirrel cage, having normal starting and break down torque. Motor shall be in accordance with Specification Section 16150.

2.2.8 Maximum envelope sizes and model numbers of equipment (or equal) are listed in Attachment B.

2.3 COATINGS

Electrical motor and exposed parts of the support frame for the pump shall be painted with recommended manufacturer standards. Stainless steel, plastics and elastomers shall not be painted unless specified otherwise.

2.4 FACTORY ACCEPTANCE TESTS (FATS)

- A. Seller shall shop test the unit to verify pump performance. A detailed shop testing procedure shall be submitted for Buyer approval prior to testing. Buyer shall be notified in advance of all source testing and shall be allowed to witness all tests (FATs).
- B. Pump shall be tested at the factory to provide detailed performance data and demonstrate its conformance with specifications. The pump shall be hydrostatically tested for a period of time not less than 30 minutes. The test pressure

shall be not less than one and one-half times the head capabilities of the maximum diameter impeller for the casing at shutoff, plus the pump maximum allowable suction head. In no case shall the test pressure be less than 250 psig. Pump casing shall be tight at the test pressure. During the test, no visually detectable leakage shall occur at any joint.

С. Seller shall furnish certified shop test curves and FAT reports. These shall show pump head-capacity, efficiency and brake horsepower.

2.5 LABELING

Labeling shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6. This shall be in addition to the manufacturer's identification plate.

Pump shall be provided with a cast in or permanently attached direction of rotation arrow located on drive end of the pump.

2.6 **PACKAGING**

Preparation for shipment and packing shall conform to Seller's standards. At minimum, packaging shall provide protection against corrosion and damage during normal handling, shipping and storage. Minimum preparation shall include the requirements listed below.

- 2.6.1 Machined surfaces, threads, bearings and bearing housings shall be protected during shipment by application of grease or other suitable rust inhibiting compound.
- 2.6.2 Flanged openings shall be covered with wood or plastic protectors. Protectors shall be installed with a minimum of four (4) full diameter steel bolts and nuts of compatible material with the flange.
- 2.6.3 Threaded connections and tapped holes shall be capped or plugged using compatible materials to prevent thread damage.
- 2.6.4 Sump Pump Unit Assembly shall be shipped fully assembled.
- 2.6.5 Bracing, supports and rigging connections shall be provided to prevent damage during shipment, lifting and unloading.
- 2.6.6 Separate or loose parts shall be completely boxed and attached to the main item to be shipped as a unit. All shipping boxes shall be identified by the Seller's order number, equipment number, and equipment description in ink, paint, or other indelible material.
- 2.6.7 One complete set of installation, operating and maintenance instructions shall be packed with each assembly.

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U.S. DEPARTMENT OF ENERGY Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

Rev. 0

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PART 3 EXECUTION

(Not Used)

END OF SECTION

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NOZZLES	SIZE	- HAI	ING	FACI	NG	10	CATION	<u> </u>	CONNECTION	S SIZE	TYPE
Suction		- 		 					ain	-	+
Discharge —	<u> </u>	<u>_</u>		<u> </u>		<u> </u>		Ve			
Casing Mount:	Foot L	Bracket	Impel	ler Diamete	r (Inches)				essure Gage		
Centerline	Near Cntri.	Inline	Ra	ted	. <u>Max.</u>	ا	Min	W	ırm Up		<u> </u>
Casing Split:	Axial [Radial	i mpeli	er Type:	Оро	n	☐ Closed	Ba	iance Line		
Casing Type:	Diffuser [] Staggered	lmp. 8	Suction:	☐ Sing	jle	☐ Double	Pa	cking:		
☐ Single Volute	☐ Double	Volute	Imp. ł	Mount:	☐ Btwr	n. Brgs	Overhung	J	Manufacturer _		
Max. Allowable Pre	essure (PSIG):		Rotati	on (Couplir	ng End):	□ cw	□ ccw		Туре		
			_ Bearin	ng (Type/Nu					Size/No. Rings		
	emp			dial	_			Me	chanical Seal:		
Hydro Test Pressur	•		- Th	rust				_	API Class code		
Lubrication Type:		API 614	Coupl	ling:					Manufacturer _		
Grease [Ring Oil	Oil Mist	M	nufacturer		_			Model		
☐ Flood [] Flinger [Pressure	Ty	pe/Model _					Mfr. Code		
Remarks:				Half-Coupl	-	-			O Cartridge	Type Requi	red
			○ Pu	mp Mfr. 🔘) Driver M	Hr. O	Purchaser	GI	and Type/Mat'i.;		
l						_			Gland Plate Tap	•	
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ATTACHMENT B EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

		MAXIMU	I ENVELOPE (i	nches)
TAG NUMBER	NODEL MUNBER*	LENGTH	HTOIM	HEIGHT
PX-520-002	Goulds 3171 Size 1 X 1-1/2 - 6ST	22	22	64
PX-520-005	Goulds 3171 Size 1 X 1-1/2 - 6ST	22	22	64
PX-520-007	Goulds 3171 Size 1 X 1-1/2 - 6ST	22	22	64
PX-520-008	Goulds 3171 Size 1 X 1-1/2 - 6ST	22	22	64

^{*} Equipment shall be of this model number or equal.

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SECTION 15148 SEALLESS PUMPS B-595-P-P33B-15148

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE <u> </u>	WAPA YES NO _X QUALITY LEVEL I II _X SAFETY CLASS 1 2 3 _X 4
ORIGINATOR: Shakar	CHECKER:
J. J. Ichkhan, Mechanical Engineer Date	D. A. Buzzelli, Lead Disc. Checker Date
APPROVED BY:	
R.B. Erickson C. J. Divona Lead Discipline	I-26-93 Engineer Date

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SECTION 15148 SEALLESS PUMPS B-595-P-P33B-15148

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SECTION 15148 SEALLESS PUMPS

PART 1 GENERAL

1.1 SUMMARY

This specification section covers the technical requirements for the design, fabrication, inspection and testing of sealless centrifugal pumps.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B73.1M

1984 Horizontal End Suction Centrifugal

Pumps for Chemical Process

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
Boiler and Pressure Vessel Code

ASME Section VIII, Division 1

1989 Rules for Construction of Pressure

Vessels

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1

1990 Structural Welding Code Steel,

12th Edition

ANTI-FRICTION BEARING MANUFACTURERS ASSOCIATION (AFBMA)

AFBMA 9

1990 Edition - Load Ratings and Fatigue

Life for Ball Bearings

AFBMA 11

1990 Edition - Load Ratings and Fatique

Life for Roller Bearings

HYDRAULIC INSTITUTE (HI)

ΗI

1983 Standards for Centrifugal, Rotary and

Reciprocating Pumps, 14th Edition

9415202.0700

INSTRUMENT SOCIETY OF AMERICA (ISA)

ISA S20

1981 Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA Standard

1978 Guards for Rotating Equipment

Instruction 1-12.14

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-6

1989 Surface Preparation Specification No. 6, Commercial Blast Cleaning

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

Specification Section 15196 Identification and Tagging Methods

for Mechanical Equipment

Specification Section 16150 Motors - Induction for General

Service

1.4 DEFINITIONS

9415202.070

FAT - Factory Acceptance Test
NPSH - Net Positive Suction Head
RPM - Revolutions Per Minute
TEFC - Totally Enclosed Fan Cooled

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 Drawings

1.6.1.1 A. Certified dimensional outline drawings shall be submitted.

These drawings shall include dimensions, shipping weights, operating weights and clearances to be maintained. They shall also show design temperatures and pressures, size and location of all connections, lifting supports, materials of construction and corrosion allowances. Drawings which include the base frame shall include base plate thickness at

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- the foundation bolts, location of anchor bolts and size of control panel fastenings.
- Sectional drawings shall be submitted for Buyer approval. В. These drawings shall show inside arrangement construction and details for each component.
- С. Allowable loads on both the pump discharge nozzles and suction nozzles shall be furnished.

All drawings shall include a detailed Bill of Materials. This shall list manufacturer, type and rating of all components.

- 1.6.2 Technical Data
- 1.6.2.1 Design Calculations - Seller shall provide an engineering design analysis with supporting calculations used to establish horsepower requirements, shaft sizes, bearing loads and operating characteristics in accordance with data sheets (Attachment A). These calculations shall be sufficiently complete to permit second-party review.
- 1.6.2.2 Descriptive Literature - Descriptive literature shall be provided. This literature shall include equipment ratings, model numbers, operating characteristics and technical descriptions.
- 1.6.2.3 Data Sheets
 - Completed data sheets as indicated in P33B-DS-1 through Α. DS-17 (Attachment A).
 - Complete ISA S20 specification forms for process measurement В. and control instruments, primary elements and control valves.
- 1.6.2.4 Pump Performance Curves - Pump performance curves shall be provided. These curves shall include pump brake horsepower, efficiency, required net positive suction head (NPSH), viscosity and specific gravity corrections.
- 1.6.2.5 Nozzle loadings in accordance with ANSI B73.1M.
- 1.6.2.6 Factory Acceptance Tests (FATs) as defined in Paragraph 2.3.
- 1.6.3 Spare Parts List

A list of recommended spare parts for one (1) year's routine operation shall be supplied. The spare parts list shall include sufficient data to permit procurement either from original manufacturer or any subsupplier.

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1.6.4 Installation, Operation and Maintenance Manuals

Seller shall provide operation and maintenance manuals. These shall cover the centrifugal sealless pumps furnished in accordance with this specification section. These manuals shall fully detail sequences of disassembly, repair, adjustment, reassembly, lubrication and troubleshooting. Troubleshooting sections shall include fault trees to guide both mechanical and electrical diagnostics. The manuals shall include reduced-size copies of any assembly drawing, subassembly drawing or parts list needed for routine maintenance and overhaul. This data shall be submitted in accordance with Specification Section 01730. Complete installation manuals shall also be submitted.

1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

A. Site Elevation 714 feet above sea level

B. Barometric Pressure 14.3 psia

C. Outside Design Temperature

1) Maximum Design Temperature 110°F

2) Minimum Design Temperature -20°F

3) Wet Bulb Design Temperature 68°F

1.8.2 Operating Environment

A. Normal Temperature 60°F to 104°F

B. Maximum Temperature 104°F

C. Relative Humidity Not controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General Requirements

Sealless pumps shall be furnished by a manufacturer normally engaged in the production of industrial sealless pumps. The pump

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furnished in accordance with this specification section shall be a sealless centrifugal pump designed and constructed in accordance with the requirements of ANSI B73.1M. The sealless pump furnished shall have a magnetic drive.

All exposed moving parts shall have heavy-duty removable guards provided in accordance with OSHA Standard Instruction 1-12.14.

Seller shall be responsible for pump design, selection and performance. Pump characteristics and selection shall be in accordance both with ANSI B73.1M and the Hydraulic Institute Standards (HI).

2.1.2 Baseplates and Supports

A fabricated steel drive baseplate shall be furnished for the separate mounted motor pump assembly. The baseplate material shall conform with the pump material. This baseplate shall be designed such that all equipment and auxiliary piping are located within its confines. It shall be rigid enough to maintain pump machinery alignment during shipping without the need for grouting.

Lifting lugs or other arrangements for hoisting and handling the assembled unit during field erection shall be provided.

- Α. Pump and motor support pads shall be machined flat and in the same plane within 0.002 inch per foot between pads.
- В. Motor support pads shall be machined to provide a shim height of not less than 3/16 inch.
- C. That portion of the baseplate under the pump shall have a drain pan with raised lip construction. The drain pan shall have a connection at the pump outboard end.
- Shaft centerlines shall be of sufficient height above the D. baseplate to permit piping of all auxiliary connections.
- Ε. No unit component except the motor conduit box shall overhang the drained area of the baseplate.
- F. Anchor bolt size shall be not less than 3/4-inch diameter.
- Pipe supports shall provide piping flexibility and G. accessibility necessary for proper operation and maintenance.
- 2.1.3 Maximum envelope sizes and model numbers of equipment or equal are illustrated in Attachment B.

2.2 **FABRICATION AND MANUFACTURE**

2.2.1 General Requirements

The pump operating point shall be within 10 percent of the peak efficiency on the pump performance curve. Horsepower requirements shall not exceed the nominal rating of the motor as shown on the nameplate at design conditions and at maximum horsepower along the pump curve. This excludes the service factor.

All rotating parts of the assembled equipment shall operate throughout the required range without excessive vibration, thrust or noise. The noise level shall not exceed 85 dB at 3 feet peripheral around the pump skid.

2.2.2 Pump Casing

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Pump casings shall be designed for the maximum discharge pressure at pumping temperature and hydrostatic test pressure at ambient temperature. Materials, casting factors and the quality of any welding shall be in accordance with ASME Section VIII, Division 1. Code stamp and data report forms are not required.

2.2.3 Magnetic Drive

The design shall use magnets to ensure non-slip pump operation to 400°F throughout the entire performance range. It shall also have zero leakage.

2.2.4 Materials

Pump casing material shall be in accordance with ANSI B73.1M. material shall be identified in accordance with this standard. Bearings and shafts shall be Seller's standards for the intended service.

Castings shall be sound. No shrink, blow holes, scale, blisters or other defects shall be permitted. Surfaces shall be cleaned by Seller's standard methods. All casting burrs shall be filed or ground flush with the casting surface. The use of plastic or cement compounds to repair leaks and defects in pressure casings shall not be permitted.

2.2.5 Bearings

Bearings shall be sized to take the thrust loads of 150 percent of rated capacity at maximum speed. The life for antifriction bearings specified therein shall be L-10 of 100,000 hours service life calculated in accordance both with AFBMA 9 and AFBMA 11. The bushings shall provide long internal bearing life across the duty

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range. An internal bushing holder shall be used to ensure correct alignment of the rotating element.

2.2.6 Vibration

Major rotating components such as impellers and balancing drums shall be dynamically balanced in accordance with ANSI B73.1M. Peak-to-peak vibration limits shall apply to all pumps. These limits shall cover rotor vibration during shop and field tests at rated speed throughout the full operating capacity. Peak-to-peak limits measured on the shaft are as follows:

SPEED (RPM)	PEAK-TO-PEAK LIMIT (MILS) (measured on bearing housing)
1800 and below	1.5

2.2.7 Coupling

30/1727 H

Pump manufacturer shall mount pump and motor half couplings. Coupling shall be rated for not less than 150 percent of motor nameplate horsepower at design rpm. All metal flexible coupling shall be keyed to both shafts and shall be the dielectric type. Couplings and guards shall be in accordance with OSHA Standard Instruction 1-12.14.

2.2.8 Safety Guarding

All safety guards, color coding, signs, accessibility, etc., shall be in accordance with OSHA Standard Instruction 1-12.14. Safety guards shall be designed such that the guarded equipment is easily accessible for maintenance.

2.2.9 Electric Motors

Transfer switch for emergency power supply is not required.

Motors shall be integral, foot-mounted, Totally Enclosed Fan Cooled (TEFC), squirrel-cage induction type. They shall have normal starting and breakdown torque. Motors shall be in accordance with Specification Section 16150 except as modified herein.

2.2.10 Coatings

After completion of all fabrication procedures the external surfaces of each pump shall be thoroughly cleaned of all foreign material, including rust, in accordance with SSPC SP-6. Manufacturer's standard prime and finish paint or coatings shall be applied. Stainless steel surfaces shall not be painted unless specified otherwise.

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2.2.11 Welding

All pump unit assembly welding requirement for baseplates and supports shall be in accordance with AWS D1.1.

2.2.12 Labeling

Labeling and tagging shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6. This shall be in addition to the manufacturer's identification plate. The pump shall be provided with a cast in or permanently attached direction of rotation arrow located on the drive end of the pump.

2.2.13 **Packaging**

- Preparation for shipment and packing shall be in accordance with 2.2.13.1 Seller's standards. At minimum, they shall provide protection against corrosion and damage during normal handling, shipping and storage. Minimum preparation shall include the requirements listed below.
- Machined surfaces, threads, bearings and bearing housings shall 2.2.13.2 be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- Flanged openings shall be covered with wood or plastic protectors. 2.2.13.3 Protectors shall be installed with not less than four (4) full diameter steel bolts and nuts of compatible material with the flange.
- Threaded connections and tapped holes shall be capped or plugged. 2.2.13.4 Compatible materials shall be used to prevent thread damage.
- Pump Unit Assemblies shall be shipped fully assembled on 2.2.13.5 baseplate.
- Bracing, supports and rigging connections shall be provided to 2.2.13.6 prevent damage during shipment, lifting and unloading.
- 2.2.13.7 Separate or loose parts shall be completely boxed. The box shall then be attached to the main item to be shipped as a unit.

All shipping boxes shall be identified by Seller's order number. equipment number and equipment description.

2.3 INSPECTION AND TESTING

Inspection and testing shall be in accordance both with HI Standards and ANSI B73.1M.

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- 2.3.1 Factory Acceptance Tests (FATs)
- Seller shall shop test the unit to verify pump performance. A 2.3.1.1 detailed shop testing procedure shall be submitted for Buyer approval before testing begins. Buyer shall be notified in advance of all source testing. Buyer reserves the right to witness all tests (FATs).
- Pump shall be tested at the factory to provide detailed perform-2.3.1.2 ance data and demonstrate its conformance to specifications. The pump shall be hydrostatically tested for a period of time not less than 30 minutes. The test pressure shall be not less than one and one-half times the head capabilities of the maximum diameter impeller for the casing at shutoff, plus the pump maximum allowable suction head. In no case shall the test pressure be less than 250 psig. Pump casing shall be tight at the test pressure. During the test no visually-detectable leakage shall occur at any joint.
- Seller shall furnish certified shop test curves and FAT reports. 2.3.1.3 These curves shall show the pump's head-capacity, efficiency and brake horsepower in accordance with HI Standards.

PART 3 EXECUTION

80/072029 H6

(Not Used)

END OF SECTION

☐ Grease

☐ Flood

Remarks: _

☐ Ring Oil

Flinger

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Oil Mist

Pressure

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		Pump Ta				' I	304L		
Pump Mfr.				AICH IAN	K TRANSFER	Impeller			
Size & Type		PUMI	P			Internal Pa	rts304L	S.S.	
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Serial No.			g No		NUFACTURER		Driven		
		Motor Pri	ovided By						
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Normal Max	Min	Discharg	je Pressure	(PSIG): _	62	Altitude (Fe	oet):		
Specific Gravity: @ °F=	0.9980	Suction I	Pressure (F	'SIG):		Olndo	or O Heat	er OP	loof
Vapor Press. (PSIA):		Max.		Rate	d <u>0.6</u>	Out	door O Unhe	ater ∩ S	un
Viscosity (CP): @ °F=						1 -	fication:		
		i			444				
Corrosion/Erosion Caused By:			•	eet):					
Remarks:				et):		Remarks: _			
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		PERFORMA	VNCE (To B	e Complet	ed By Manufactur	er)			
Proposal Curve No.:		Minimum	Continuo	is Flow (GI	PM):	NPSH Requ	uired (Feet Wate): 	
Speed (RPM):		Therma	al	Stable		3% Head	d Drop		
Efficiency (%):		Max. Hea	ad Rated In	np. (Feet):		Suction Sp	ecified Speed: _		
Rated Power (BHP):							·		
					urchaser and Ma	nufacturer)			
NOZZLES SIZE	RA	TING	FAC	ING	LOCATION	MISC	CONNECTION	S SIZI	E TYPE
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Discharge						Ve	nt		
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Centerline	☐ Inline	Ra	ted	Мах	Min	. W	arm Up		
Casing Split: Axial	☐ Radial	Impeli	er Type:	Open	☐ Closed	В	lance Line		
Casing Type: Diffuser	Staggered	-	Suction:	Single		Pe	icking:		
` ''	uble Volute	-	Mount:		Brgs D Overhui	na	Manufacturer _		
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At 60°F			ng (Type/Nu	• .			Size/No. Rings		
At Nom, Pump Temp.				•		м	echanical Seal:		
Hydro Test Pressure (PSIG):			rust			<u> </u>	API Class code		
Lubrication Type:	☐ API 614	Coupl	ina:				Manufacturer _		

O Pump Mfr. O Driver Mfr. O Purchaser

Driver Half-Coupling Mounted By:

Model _

Mfr. Code _

Gland Type/Mat'l.:_

O Cartridge Type Required

Gland Plate Taps Required for:

Manufacturer.

Type/Model _

9	FLUOR	DANIEL DATA SHEET
7	LOOM	DATA SHEET

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ALL ITEMS SHALL	COMPLY WITH G	ENEF	AL SPE	CIFICATIO	ON SHEET	S:	SS 151	48						
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Pumping Tempera	ture (°F):		- 1	Norm	al <u>70</u>	Re	ated	70	Rel. H	lumid.	(%): Max		Min.	
Normal _70	Max. 120 M	in	— 1	Discharg	e Pressure	(PSIG): .	6	0	Altitud	de (Feet):			
Specific Gravity: @	<u>70</u> °F=	0.998	<u> </u>	Suction i	Pressure (F	PSIG):			ے ا) Indoo	r OHe	ater () Roc	of
Vapor Press. (PSIA				Max.		Rat	ted	0.6	ľ		or QUr		_	
Viscosity (CP): @	<u>70</u> °F= _	0.98		Differenti	ial Pressure	e (PSI): _	60		I -		cation:		_	
Corrosion/Erosion	Caused By:		<u> </u>	Differenti	ial Head (F	eet):	13	9						
Remarks:				NPSH A	vailable (Fe	et):	3	3						
Tierrarks.					c Power (H				Rema	ırks:				
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Proposal Curve No					Continuo	us Flow (0	3PM):			•	ed (Feet Wa	•		
Speed (RPM):		·· - · ·		Therm	al	Stab	l e	,	3%	Head	Drop			
Efficiency (%):				Max. Hea	ad Rated Ir	np. (Feet)	:		Suction	n Spec	ified Speed	:		
Rated Power (BHP	P):			Max. Pov	ver Rated I	mp. (BHP	"):							
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NOZZLES	SIZE		RATI	NG	FAC	ING	LO	CATION		MISC.	CONNECTION	ONS	SIZE	TYPE
Suction					<u> </u>		L		I L	Drai	n			<u> </u>
Discharge	<u> </u>	l_			<u> </u>				L	Ven	1			<u> </u>
Casing Mount:] Foot	□ Bra	acket	impel	ler Diamete	er (Inches))			Pres	sure Gage			
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Casing Split:] Axial	☐ Ra	dial	Impel	ler Type:	Ope	en	☐ Closed		Bala	ince Line			
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☐ Single Volute	☐ Doubl	le Volu	rte	lmp. I	Mount:	☐ Btwi	n. Brgs	Overhun	g	Į	Manufacture	r		
Max. Allowable Pro	essure (PSIG):			Rotati	on (Coupli	ng End):	□ cw	□ ccw		7	ур е			
At 60°F				Bearin	ng (Type/N	umber):				8	Size/No. Rin	gs		
1	Гетр										hanical Sea			
Hydro Test Pressu				Th	rust						API Class co			
Lubrication Type:		☐ AP		Coup	ling:						Manufacture			
E _	_			M	anufacturer				—	ı	leboN			
1	⊒ Flinger I	☐ Pre	essur e	,	pe/Model .					ı	vifr. Code			
Remarks:					Half-Coup	_					O Cartridg		•	
ļ -				() Pu	mp Mfr. (Driver M و	ATT. ()	Purchaser			nd Type/Mai			
4071000400000000				^	_ D. D.	г	٦_ ~	Mar (Down)			nd Plate Tap			
105\OS\101\207\845718	s/5.MIS/WP51-01/26/93	з 1:40рг	n		= by Pure	cnaser L	_ = By	Mfr./Purchas	<u>ier</u> O	Quenc	n 🔾 Flush	U Drair	1 O V	ent

9	FLU	OR DANIEL DATA SHEET
	110	Deportment of Energy

U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

NO. BY	REVISION	SHEET NO.		REV.
DATE		—— P33.	B-DS-3	0
/\	┥	DATE	CO	NTRACT
\wedge		03-15	90	845734
$\overline{\wedge}$		TAG NO.	PX-520-00	24
\wedge		SPECIFICATIO		
Λ		ORIG BY	15148 CHK'D	APPR'O
<u> </u>		Chiq Bi	CHKB	APPAD
\wedge	-{	HBJO	SSL	

ļ SI	EALLESS F	PUMPS	•		- 					- Chia Bi	CHKD	[^	
					VV			——————————————————————————————————————		HBJO	SSL		
ALL ITEMS SHALL	COMPLY WITH	GENER	AL SPE	CIFICATION	ON SHEET	rs:	H-2-12	3360-2 (SS 1	5148)				
	DRAIN CATCH				or Driven _		1			PUMP M	ATERIAL:	S	
Service TRANSFER PUMP							EV EX		Casing	3	04L S.S.		
1 = 4.44			Pump Ta	-	OU TANK	PX-520	HUU4	Impeller	, 3	04L S.S.			
Size & Type				-	PRAIN CAT						MISS		
					ISFER PUN	AP .				Parts3			
No. Stages				Motor Ta	ıg No		SAME		No. Pum	ps Req1			
Serial No				Motor Pr	rovided By	, <u>MAN</u>	UFACT	JRER	<u></u>				
	LIQUID		т		OPERA	TING CO	IDITION		No. Turbi	ine Driven _N			·
Name _WASTE				Capacity	(U.S. GP		DIION	<u> </u>	Temp 6	SITE CON			
Pumping Tempera					al 30	•	ated	30					
Normal 70	• •	Min			ge Pressur		_			nid. (%): Max		Min.,	
Specific Gravity: @			_					<u> </u>	_ `	(Feet):			
			- 1		Pressure (•		0.60	_	•		O Roc	
Vapor Press. (PSI/							**	0.00	1	utdoor OU		O Sur	1
Viscosity (CP): @		4010	-		ial Pressur				Area Clas	ssification:			
Corrosion/Erosion	Caused By:	ACID			ial Head (I	,			Other:				
Remarks:			-	NPSH Available (Feet): 33					Remarks:				
				Hydrauli	c Power (I	HP):	0.9	 					
								Manufacture		-			
Proposal Curve N										quired (Feet W			
Speed (RPM):								******		ad Drop			
Efficiency (%):									Suction S	specified Speed	:		
Rated Power (BHF	P):												
	I				Го Ве Соп	npieted By		ser and Man	_				
NOZZLES	SIZE		RATI	NG	FAC	CING	ro	CATION	MIS	SC. CONNECTI	DNS	SIZE	TYPE
Suction Discharge					<u> </u>					Drain			<u> </u>
	1 7								_	Vent			┝
Casing Mount:	_	☐ Brad		•	ler Diamet	•	•		Pressure Gage				
_	Near Cntrl.	∐ Inlin			ited			Min	_	Warm Up			—
_	Axial	☐ Rad		-	ler Type:	•		Closed	<u> </u>	Baiance Line	<u> </u>		<u> </u>
_ ,,	Diffuser	Stag ble Volut	_	•	Suction:	Sing		Double		Packing:			
Single Volute		DIE VOIUT	•	Imp. Mount: Btwn. Brgs Overhung					3	Manufacture			
Max. Allowable Pro	` ,			Rotation (Coupling End): CW CCW					Type				
At 60°FAt Nom. Pump Temp			Bearing (Type/Number):				Size/No. Rings						
Hydro Test Pressure (PSIG):				Thrust					Mechanical Seal: API Class code				
Lubrication Type: API 614				Coupling:					Manufacturer				
☐ Grease ☐ Ring Oil ☐ Oil Mist				Manufacturer									
☐ Flood [☐ Flinger	☐ Pres	sure	Type/Model					Mfr. Code				
Remarks:					Half-Coup				Cartridge Type Required				
				Pump Mfr. Driver Mfr. Purchaser					Gland Type/Mat'l.:				
105100140410000000000000000000000000000				_			٦ _			3land Plate Tap			
105\O\$\101\207\845718	/e.MIS/WP51:01/26/	93 10:05am		. 0	= By Pure	chaser L	J = By	Mfr./Purchase	or O Que	ench O Flush	O Drain	OV	ent

				AT	TACHME	NT /	Α							
				NO.	BY DATE	\dashv	REVISK	ON	SHEET NO.		R	EV.		
FLUOR D	ANIEI								P33B-DS-4		O			
3 recon b	DATA SHEE	Г		\mathcal{H}		+			—	- 1		_		
	tment of Ene			KYE		_			03-15-1 TAG NO.			5734		
Hanford W		\triangle \vdash		\dashv				PX-520	2-006					
Richland, \	Nashington					\Box	·		SPECIFICATION	N SECT N	Ю.			
DOE Conti	ract DE-AC06	86RL108	38	[] -		\dashv				151				
SE/	ALLESS PUR	APS		Δ		⇉			ORIG BY	CHKD	^	PPR'D		
				\triangle		╛			HBJO	SS	iL .			
ALL ITEMS SHALL C	OMPLY WITH GE	NERAL SP	ECIFICATI	ON SHE	ETS:	22.	15148							
							1		PUMP M	TERIA	s			
ORGANIC ACID DRAIN CATCH Service TANK TRANSFER PUMP				-	1			Casing		4L S.S.				
1			Pump Ta	ıg No.		PX-	520-006	•	~	HL S.S.				
Pump Mfr			ORGAN	IIC ACID	DRAIN CA	ТСН	TANK	impelle						
Size & Type			TRAN	SFER PL	JMP		·	internal	Parts30	ML S.S.	,			
No. Stages			Motor Ta	- 11-		SA	ME	No. Pum	ips Req1					
Serial No.			Motor la	•	8444		CTURER	1						
Serial 110.			MIOLOT PT	OVIO G O E	ъу		· · · · · · · · · · · · · · · · · · ·	No. Turb	ine Driven					
	LIQUID			OPER	ATING CO	NDITI	ONS	ĺ	SITE CON					
Name WASTE W	TER (ORG. ACID		Capacity					Temp. (°	F): Max		Min.			
Pumping Temperatu	ire (°F):		Norm	al _30	F	lated	30	Rel. Hun	nid. (%): Max		Min.			
Normal 70 M			1					Altitude (Feet):						
Specific Gravity: @		_	Discharge Pressure (PSIG): 51.9 Suction Pressure (PSIG):						O Indoor O Heater O Roof					
			Max. 2.6 Rated 0.60					1	_		_			
Vapor Press. (PSIA):		0.00	1					_	outdoor OUr		() Su	n		
Viscosity (CP): @ _	Differential Pressure (PSI):					Area Cla	ssification:	3						
Corresion/Eresion C	Differential Head (Feet):					Other:								
Remarks:	NPSH A	vailable	(Feet):	3	<u> </u>	Remarks:								
			Hydrauli	c Power	(HP):	0.1	9							
		P	ERFORM	ANCE (T	о Ве Сотр	leted	By Manufacture	M)						
Proposal Curve No.									equired (Feet Wa	ater): _				
Speed (RPM):			Therm	al	Stat	ole _		3% H	ead Drop					
Efficiency (%):									•					
1									specilied Speed					
Rated Power (BHP):														
NOZZIEC	6175	1				y Pul	rchaser and Mar			T	0.75	7 = =		
NOZZLES Suction	SIZE	l na	ring		ACING	╁	LOCATION	MI	SC. CONNECTE	UNS	SIZE	TYPI		
Discharge		<u> </u>		 		╁		!	Drain			+		
		<u> </u>		L		<u> </u>		' ├─	Vent	-+		+		
Casing Mount:		Bracket	•		eter (Inches				Pressure Gage					
_		Inline	Re	bet	Max				Warm Up			┿		
1		Radial	•	ier Type:	•		Closed		Balance Line	1		<u> </u>		
Casing Type:	Diffuser	Staggered	l imp. S	Suction:	☐ Sin	gle	☐ Double		Packing:					
Single Volute	Double	Volute	Imp. I	Mount:	☐ Btw	n. B	rgs 🗖 Overhun	g	Manufacture	f				
Max. Allowable Pres	sure (PSIG):		Rotati	ion (Cou	pling End):		cw 🗆 ccw		Туре	_				
			_ Bearin	ng (Type	/Number):				Size/No. Rin	gs				
At Nom. Pump Te	•								Mechanical Sea					
Hydro Test Pressure		•		rust					API Class co	de				
Lubrication Type:	_	API 614	Coup	ling:					Manufacture	r		_,		
i		Oil Mist	Ma	anufactu	rer				Model					
	Flinger	Pressure		•					Mfr. Code _					
Remarks:			. Driver	r Half-Co	upling Mou	ınted	By:		○ Cartridg	е Туре	Requir	ed		

105\OS\101\207\84571881.MIS/WP51-01/26/93 10:07am

O Pump Mfr. O Driver Mfr. O Purchaser

O Cartridge Type Required

Gland Plate Taps Required for:

Gland Type/Mat'l.:_

E	FLUOR	DANIEL	
		DATA SHEET	

U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

	ATTACHMENT	Α						
VO.	BY DATE	REVISION	SHEET NO.	REV.				
Λ					0			
$oldsymbol{L}$			DATE		TRACT			
ΛΙ			03-15-9	0	845734			
ᅰ		<u> </u>	TAG NO. PX-520-009					
Δ				re				
Λ	1.0		SPECIFICATION	SECT NO.				
¥				15148				
			ORIG BY	CHK'D	APPR'O			
$\overline{\lambda}$		-	┥					
Δ			HBJO	SSL				

SE	EALLESS PU	MPS		\mathbf{A}		二_			ORIG BY	CHK.D	APPR'O		
						<u> </u>			HBJO	SSL			
ALL ITEMS SHALL	COMPLY WITH G	ENERAL SPI	ECIFICATION	<u>ON SHEE</u>	<u>:TS:</u>	SS 15	5148						
5	R DRAIN SAMPLIN	IG	No. Moto	r Driven.		1			PUMP MATERIALS				
Service	TRANSFER PUMP	 	Pump Ta	a No.		PX-52	20-009	Casing		4L S.S.			
Pump Mfr.			FLOOR DRAIN SAMPLING TANK					Impelie		4L S.S.			
Size & Type			TRANS	SFER PUI	MP			Internal	Parts30	4L S.S.			
No. Stages			Motor To	= Na		SAME	<u> </u>	No. Pum	ps Req1				
Serial No.		T	MOTOL 198 IAO.					No. Turb	ine Driven				
	LIQUID					-							
NameWASTF M		•	Capacity	(U.S. GF	ATING CON	DHIO	NS	Town 6	SITE CON				
Pumping Temperat					R	atad	75		F): Max		n		
	Max Mii	_					62		nid. (%): Max		n		
Specific Gravity: @			· ·		re (PSIG):			_	(Feet):		_		
Specific Gravity: @ Vapor Press. (PSIA			1	Pressure	, ,		0.60	_	door OHe	•			
Viscosity (CP): @					Ra			1	utdoor O Un	_	iun		
Corrosion/Erosion			1		ure (PSI):				ssification:				
Remarks:					(Feet):			Other:					
Hemarks,			NPSH Available (Feet): 33				Remarks:						
				Hydraulic Power (HP): 2.7 — RFORMANCE (To Be Completed By Manufacturer)									
Proposal Curve No									d d /E4 \8/-		<u></u>		
Proposal Curve No.: Minimum Continuous Flow (GPM): Speed (RPM): Stable						NPSH Required (Feet Water):							
			Max. Head Rated Imp. (Feet): Si Max. Power Rated Imp. (BHP):				Suction a	Specified Speed:					
Haten FOWER (DITE):												
NOZZLES	SIZE	PAT			CING		naser and Man OCATION		SC. CONNECTIO	- L 0121	- T 7/05		
Suction		1			2010		JOATION		Drain	NS SIZI	E TYPE		
Discharge		<u> </u>				 			Vent		+		
Casing Mount:	Foot [Bracket	impell	er Diame	ter (Inches)	1			Pressure Gage		 		
		Inline			Max		Min	t	Warm Up		_		
] Radial		er Type:	_		Closed		Balance Line	$\neg \dagger \neg$	 		
Casing Type:		Staggered		Suction:	Sing		Double		Packing:	I	<u> </u>		
Single Volute	☐ Double		Imp. M				Overhung	9	Manufacturer				
Max. Allowable Pre			Rotatic	on (Coupl		_	v 🗆 ccw	•	Туре				
			. Bearin	g (Type/N	Number):				Size/No. Ring				
	emp							•					
Hydro Test Pressur		Thrust					API Class code						
Lubrication Type:		J API 614	Coupli	•					Manufacturer				
		Oil Mist							Model				
] Flinger [Pressure			pling Mour			_	Mfr. Code				
Homarks.						-	y:) Purchaser		Cartridge Class Type (Mast)		ired		
	-		O. 3		J D11701 101	····	, r dicitasoi		Gland Type/Mat'i Gland Plate Taps				
105\OS\101\207\8457188	33.MIS/WP51-01/26/93	10:16am		= By Pur	rchaser [] = By	/ Mfr./Purchase		ench () Flush (•			

		ATTACHMENT	Α	
	NO.	BY DATE	REVISION	SHEET NO.
FLUOR DANIEL	$\overline{\wedge}$			P338-DS-6
DATA SHEET	$\overline{\wedge}$			03-23-89
U.S. Department of Energy Hanford Waste Vitrification Plant				TAG NO. PX-54

REV.

CONTRACT

	DATA SHE	ET					03-23-8	9	845734		
U.S. Depa	artment of En	iergy_					TAG NO.	PX-540-002			
l Hanford V	Waste Vitrifica Washington	ation Plant					SPECIFICATION				
DOE Con	ntract DE-ACO)6-86RL108(38				SPECIFICATION				
C.F	ALLECC DI	IMPC	\wedge				ORIG BY	15148 CHK'D	APPR'O		
30	EALLESS PL	JMF3						SSL			
			K_Y				J. Janzen		<u> </u>		
ALL ITEMS SHALL	COMPLY WITH	GENERAL SPE	CIFICATION SHEETS	s: H-2 -	123362-8 (SS 15	5148)					
			No. Motor Driven	1		1	PUMP MAT	TERIALS			
Service SUGAR	SOLUTION FEED			PX-5	40-002	Casing	Casing				
Pump Mfr.			Pump Tag No SUGAR SOLUTION	****		Impeller	Impeller 304L/316L S.S.				
•	•					•	304	4L/316L S.S			
Size & Type		-				Internal Part	(8				
No. Stages			Motor Tag No.	SAM		No. Pumps F	•				
			Motor Provided By		TURER	No. Turbine i	Oriven				
	LIQUID		OPERATI	NG CONDITIC	NS		SITE CONI	OTTIONS			
Name _SUCROS		н	Capacity (U.S. GPM			Temp. (°F): I		•	in		
Pumping Temperat	ture (°F):		Normal1		1.38	Rel. Humid.					
Normal	, ,	lin	Discharge Pressure		38.9	Altitude (Fee	• •				
Specific Gravity: @		1	Suction Pressure (P	•		_	r O Hea		Roof		
Vapor Press. (PSIA	AAE		Max.	•	0.9	Outdoor Ounheater Osun					
Viscosity (CP): @		608	Differential Pressure	31		Area Classification:					
Corresion/Eresion			Differential Head (Fe		.4	Other:					
Remarks:	•		NPSH Available (Fed	. 23	.6	Remarks:			<u>.</u>		
Hemana,			Hydraulic Power (Hi	0.01	18	Meiliaine.					
		Př	ERFORMANCE (To B		E. Manufactura	<u></u>					
Proposal Curve No	n ·		Minimum Continuou			n) NPSH Requir	ad (Feet Wal	tar)			
Speed (RPM):											
			Max. Head Rated Im				·-				
							meu speeu.				
nated Fower (Dr.)): 		Max. Power Rated In								
NOZZLES	SIZE	RATI	JCTION (To Be Comp ING FACII		LOCATION		CONNECTIO	NIS SIZI	E TYPE		
Suction	<u> </u>	1	1,12	-	LUON I I I I	Drai		100 512	1176		
Discharge						Vent					
Casing Mount:	Foot	☐ Bracket	Impeller Diameter	r (Inches)			ssure Gage	$\neg \vdash$			
_	_	☐ Inline	Rated		. Min	War	m Up	$\neg + \neg$			
		Radial	Impeller Type:	Open	Closed		ince Line	_	+		
		☐ Staggered	Imp. Suction:	Single	Double	Paci	king:				
☐ Single Volute	☐ Doub		Imp. Mount:		gs 🗆 Overhung	1 Å	Manufacturer				
Max. Allowable Pre			Rotation (Couplin			-					
At 60°F			. Bearing (Type/Nu		•••	Type Size/No. Rings					
At Nom. Pump To	•			•		Mechanical Seal:					
Hydro Test Pressur			. Thrust			API Class code					
Lubrication Type:		☐ API 614	Coupling:			Manufacturer					
	•	Oil Mist	Manufacturer .			Mode!					
] Flinger	Pressure	Type/Model			Mfr. Code					
Remarks:			Driver Half-Coupli	-	-		Cartridge Type Required				
			O Pump Mfr. O	Driver wir.) Purchaser		nd Type/Mat'l nd Plate Taps		t		
105\OS\101\207\8457188	84.MIS/WP51-01/26/9:	3 1:42pm	O = By Purci	haser 🗆 = F	By Mfr./Purchase		-	·-			

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	DATA SHEET

U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

A'	TTACHMENT A				
NO.	BY	REVISION	SHEET NO.		REV.
	DATE		P33B	-DS-7	0
\triangle			DATE	CON	TRACT
		•	04-06-8	19	845734
			TAG NO.	PX-540-00	4
			SPECIFICATION	15148	
			ORIG BY	CHK.D	APPR'D
Λ			J. Janzen	SSL	<u> </u>

SE	ALLESS I	PUMPS					ORIG BY CH	SSL A	PPR'D
ALL ITEMS SHALL	COMPLY WITI	H GENERAL SP	CIFICATION SHEE	TS: <i>H-2</i>	-1 23362 -9 (SS 1	5148)	0.0020	 	
OFF-G	CAL FEED PU	NT	No. Motor Driven	4			PUMP MATE		
Service	GAL FEED TO		Pump Tag No	PX-	540-004	Casing	316		
Pump Mfr			OFF-GAS TREATE	MENT CHEMIC	AL	Impeller	316L	<u>S.S.</u>	
Size & Type			FEED PUMP			Internal Pa	rts316L	S.S.	
No. Stages	··· · · · · · · · · · · · · · · · · ·		A4-1 T N	SA	V F	No. Pumps	Req		
Serial No.			Motor Tag No Motor Provided By			No. Turbine	Driven		
	LIQUID		OPERA	TING CONDITI	ONS		SITE CONDIT	10NS	
Name			Capacity (U.S. GP			Temp. (°F):	Max	Min.	
Pumping Temperat	ture (°F):		Normal5	Rated	6.88	Rel. Humid.	. (%): Max	Min.	
Normal	Max	Min	Discharge Pressur	e (PSIG):	11.4	Altitude (Fe	et):		
Specific Gravity: @	77 °F=	0.997	Suction Pressure ((PSIG):		O Indo	or O Heate	r () Ro	of
Vapor Press. (PSIA)): 0.4	6	Max	Rated.	0.8	Outo	loor O Unhei	ater () Sui	n
Viscosity (CP): @ .	°F=	0.877	Differential Pressu	re (PSI):	0.6	Area Classi	fication:)	
Corrosion/Erosion	Caused By: _		Differential Head (Feet):2	1.5	Other:			
Remarks:			NPSH Available (F	eet):3	3.7	Remarks: _			
			Hydraulic Power (I	HP):0.0	243		 -		,
		Р	ERFORMANCE (To	Be Completed	By Manufacture	er)			
Proposal Curve No).:		Minimum Continuo	ous Flow (GPM):	NPSH Requ	ired (Feet Water)):	
Speed (RPM):			Thermal	Stable _		3% Head	Drop		
Efficiency (%):			Max. Head Rated I	lmp. (Feet):		Suction Spe	cified Speed: _		
Rated Power (BHP)):		Max. Power Rated	Imp. (BHP):					
		CONSTR	JCTION (To Be Con	npleted By Pui	chaser and Mai	rufacturer)			
NOZZLES	SIZE	RAT	ING FAC	CING	LOCATION	MISC	. CONNECTIONS	SIZE	TYPE
Suction						1	ain		
Discharge						J <u>Ve</u>			
Casing Mount:	-	☐ Bracket	Impeller Diamet	` '			essure Gage		
	Near Cntrl.	∐ Inline		Max		·	ırm Up		╂
Casing Split:	Axial	☐ Radial	Impeller Type:	☐ Open ☐ Single	☐ Closed ☐ Double		lance Line cking:		
Single Volute		Staggered	Imp. Suction: Imp. Mount:		rgs Overhur				
Max. Allowable Pre		able volute	Rotation (Coupl			9	Manufacturer		
			Bearing (Type/N		CAA FI CCAA		TypeSize/No. Rings .		
At Nom. Pump To						Ме	chanical Seal:		
Hydro Test Pressur	e (PSIG):		. Thrust				API Class code		·
Lubrication Type:	_	API 614	Coupling:				Manufacturer		
	Ring Oil	Oil Mist		r			Model		
] Flinger	Pressure			D		Mfr. Code		
Remarks:			Driver Half-Cou∣ ○ Pump Mfr. (-	•		Cartridge Ty _:.and Type/Mat'l.:_ and Plate Taps R		
105\OS\101\207\8457186	87.MIS/WP51-01/2	5/93 11:19am	O = By Pur	chaser ==	By Mfr./Purchas		ch () Flush ()		

		ATTACHMENT A		
	NO.	BY DATE	REVISION	SHEET NO.
FLUOR DANIEL	\triangle			DATE P33B-US-8
DATA SHEET				03-23-89
U.S. Department of Energy Hanford Waste Vitrification Plant	\triangle			TAG NO. PX-54
Richland, Washington	$\overline{\Lambda}$			SPECIFICATION SECT

845734

PX-540-006

	Washington	iii iain		$\overline{}$			•	SPECIFICATIO	N SECT NO.				
DOE Con	tract DE-AC06-	36RL1083	38	Δ		<u> </u>		_	15148				
QE	ALLESS PUM	DC		\sim		+		ORIG BY	CHK.D	APPR'D			
36	ALLESS FUN	ir S		\wedge				J.Janzen	SSL				
ALL ITEMS SHALL	COMPLY WITH GEI	NERAL SPE	CIFICATION	ON SHEET	rs:	H-2-1 2336 2-10 (SS	15148)						
POTAS	SIUM HYDROXIDE/		No Moto	r Driven		1		PUMP MATERIALS					
	MODIFIER FEED F	UMP	140. 141010	1 Dilyen _			Casing	31	61 S.S.				
Service			Pump Tag	g No. 🔔		PX-540-006	_		6L S.S.		_		
Pump Mfr			POTAS	SIUM HYD	HOMDE/FF	RIT MODIFIER	impelier	- 31	OL 0.0.		_		
Size & Type			FEED				Internal P	arts31	6L S.S.		_		
No. Stages			Motor Ta	g No	,	SAME	No. Pump	s Req	1		_		
Serial No.				ovided By		IFACTURER	No. Turbin	e Driven			_		
	LIQUID			OPERAT	ING CONE	ORTIONS		SITE CON	DITIONS				
NamePOTASSI	IM HYDROXIDE		Capacity	(U.S. GPI	M):		Temp. (°F)	: Max		lin	_		
(51.7% BY W	(EIGHT)		Norma	al <u>5</u>	Ra	ted 6.88	Rel. Humi	d. (%): Max	N	lin	_		
Pumping Temperat	ure (°F):				PSIG): _	07.0		eet):					
Normal	Max Min.	<u> </u>	Suction F	Pressure (f	PSIG):		O Ind	oor OHe	eater 🔘	Roof			
Specific Gravity: @	77 °F= 1.5	28	Max.		Rate	ed	Oou	ldoor O Ur	nheater 🔘	Sun			
Vapor Press. (PSIA					e (PSI):	00	Area Class	sification:	3				
Viscosity (CP): @	77 °F= 8	.581	Differential Head (Feet): 54.4 Ot										
Corrosion/Erosion	Caused By:	——	NPSH A	/ailable (F	eet):	22.9	Remarks:				_		
Remarks:			Hydraulid	Power (H	HP):	0.145					_		
			ERFORMA	NCE (To I	Be Comple	ted By Manufacture	r)						
Proposal Curve No).;		Minimum	Continuo	us Flow (G	PM):	NPSH Rec	uired (Feet Wa	ater):				
Speed (RPM):			Thermal Stable					d Drop					
			Max. Head Rated Imp. (Feet): St					•					
			Max. Power Rated Imp. (BHP):								_		
hated Fower (Brit)						Purchaser and Man	ufactureri						
NOZZLES	SIZE	RAT			ING	LOCATION	MISC. CONNECTIONS SIZE TY						
Suction)rain					
Discharge								ent					
Casing Mount:	Foot	Bracket	impeli	ar Diametr	er (Inches)		F	ressure Gage					
_	_	Inline	•	ted		Min	V	/arm Up					
	_	Radial		er Type:	Oper		-	alance Line					
_		Staggered	•	Suction:	Sing		P	acking:					
Single Volute	Double \	/olute	•	/lount:	_	. Brgs 🔲 Overhun	9	Manufacture	r	-			
Max. Allowable Pre	` '					□cw □ccw		Туре			_		
				ng (Type/N	-			Size/No. Rin	-		_		
•	emp		Radial					lechanical Sea					
Hydro Test Pressur	•	API 614	_ Thrust Coupling:					API Class co			_		
Lubrication Type:		Oil Mist	•	_				Manufacture			_		
							_	Model			_		
Remarks:	ırıınger 🗀	Pressure			oling Moun	ted By:	Mfr. Code						
				•	•	fr. O Purchaser	Cartridge Type Required Gland Type/Mat'l.: Gland Plate Taps Required for:						
105\OS\101\207\845718	91.MIS/WP51-01/26/93 11	:25am	0	= By Pure	chaser \square	= By Mfr./Purchas							

U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

	ATTACHMENT	Α		
NO.	BY	REVISION	SHEET NO.	REV
,,,,	DATE	T C VIOLOTY	P33B-D	S-9 0
Λŀ	SSL		DATE	CONTRACT
\mathbf{X}	12-05-01		06-30-89	845734
\triangle			TAG NO.	/ E 40 000
\wedge			"	-540-009
'\ 1			SPECIFICATION SE	CT NO.
\Box				15148
\wedge				K'O APPR'O
\wedge			J. Janzen	SSL

SE	EALLESS PU	MPS				+			J. Janzen	SSL		
ALL ITEMS SHALL	COMPLY WITH G	ENERAL SPI	CIFICATI	ON SHEE	TS:	H-2-1	23362-14 (SS	15148)	U. UU ILUI			
ALL ITEMO OF FILE	COM LY WITH	SEIVEL OF E		or Driven _		1	1 100	1	PUMP MA	NTERIALS		
Service FOR	RMIC ACID FEED	PUMP				PM = 4	vo 000	Casing	31	GL S.S.		
Pump Mfr			Pump Ta	-			0-009	Impeller	, 31	6L S.S.		
,			FORMIC ACID FEED PUMP							6L S.S.		
Size & Type												
No. Stages			Motor Ta	ıg No		SAME	E	No. Pum	ps Req	_1		
Serial No.				ovided By	****	JFAC1	TURER	No. Turb	ine Driven			
							•					
FORMS	LIQUID	FICUTO		~~~	TING CON	OMC	NS	9 60	SITE CON		•	
Name _FORMIC		CIGHI)		/ (U.S. GP 			44		F): Max		tin 	
Pumping Tempera	· · · ·			ai <u>0-4</u>		ted _	12.8		nid. (%): Max		tin	
Normal			_	=	re (PSIG): .		12.0	Altitude	(Feet):			
Specific Gravity: @		1.201	Suction	Pressure ((PSIG):			_	door O He	_	Root	
Vapor Press. (PSIA						ed	0.8	00	utdoor O Ur		Sun	
Viscosity (CP): @	°F=	1.8	Different	ial Pressu	ire (PSI): 🔔		 	Area Cla	ssification:	3		
Corrosion/Erosion	Caused By:	 -	Different	ial Head ((Feet):	23.2	2	Other: _				
Remarks:			NPSH A	vailable (F	Feet):			Remarks	: _1". SCHEDUL	E 160. TYP	E 31	6L
			Hydrauli	c Power (HP):	0.03		USED	FOR THE TRAN	ISFER LINE		
							y Manufacture		•			
Proposal Curve No	o.:							NPSH Re	equired (Feet Wa	ater):		
Speed (RPM):			Therm	al	Stab	e		3% H	ead Drop	···		
Efficiency (%):			Max. He	ad Rated I	Imp. (Feet)	_		Suction 9	Specified Speed	:		
Rated Power (BHF):		Max. Pov	wer Rated	Imp. (BHP): <u> </u>						
		·· · · · · · · · · · · · · · · · · · ·		T			naser and Mar					
NOZZLES	SIZE	RAT	ING	FAC	CING		OCATION	M	SC. CONNECTION	ONS SIZ	ZE	TYPE
Suction				├──				-	Drain			
Discharge	<u> </u>							· •	Vent			-
Casing Mount:	_	☐ Bracket	•		ter (Inches)			<u> </u>	Pressure Gage			
_		☐ Inline			Max			-	Warm Up			-
		☐ Radial		ller Type:	*		∐ Closed	L	Balance Line	l	-	
Casing Type:		Staggered							Packing:			
Single Volute	Doub!	e Volute	•	Mount:			s ☐ Overhun	9	Manufacture —			
Max. Allowable Pr	essure (PSIG):			ion (Coup) ng (Type/f		□ ()	w □ccw		Type Size/No. Rin			
i e	Temp				-				Mechanical Sea	_		
Hydro Test Pressu									API Class co			
Lubrication Type:		API 614	Coup	ling:					Manufacture	r		
☐ Grease [☐ Ring Oil	Oil Mist	M	anufacture	er				Model			
☐ Flood [☐ Flinger	Pressure							Mfr. Code			
Remarks:					pling Mous					e Type Red	•	
			() Pu	imp Mfr. (ODriver M	fr. () Purchaser		Gland Type/Mat			
405/00/404/404				\ _ B P	h F	1			Gland Plate Tap			
105\OS\101\207\845718	NEZ.MIS/WP51-01/26/93	1:44pm	U	/ = 59 PU!	TCDESO! L	J ≃ B	y Nπr./Purchas	er ()Qit	iench () Flush	() Drain (∷) V(ent

Remarks:

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9.20		r- r					DATE	CONTR	
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Richlar	nd, Washingto Contract DE-AC	n	" 				SPECIFICATION SEC		
			" 				ORIG BY CHK	5148	APPR'D
	SEALLESS !	PUMPS					J. Janzen	SSL	
ALL ITEMS SHA	ALL COMPLY WIT	H GENERAL SPE	CIFICATION SHE	ETS:	H-2-123362-18 (S	S 15148)			
	NITRIC ACID (50		No. Motor Driven				PUMP MATER	ALS	
Service	FEED PUMP		Pump Tag No.		PX-540-015	Casing	304/	316L	
			NITRIC ACID (5			Impeller	304L		
			FEED PUMP				Parts		
			Motor Tag No				ps Req ne Driven	<u> </u>	
Serial No			Motor Provided E	Ву	NUFACTURER	140. (016)	ne Unven		
	LIQ UID		OPER	ATING CON	DITIONS		SITE CONDITION	ONS	
NameNII	RIC ACID (50% B	Y WEIGHT)	Capacity (U.S. G	iPM):		Temp. (°F): Max	Mir	n
Pumping Temp	erature (°F):		Normal1	<u>0</u> Re	ated <u>13.75</u>	Rel. Hum	id. (%): Max	Mir	n
Normal2	7 Max7	Min	Discharge Pressi	ure (PSIG): .	15.9	Altitude (Feet):		
Specific Gravity	y: @ 77 _ °F=	1.304	Suction Pressure	(PSIG):		Olno	door O Heater	O ₽	oof
Vapor Press. (F	PSIA):	2.30	Мах	Rat	ed	000	utdoor OUnheat	er () S	un
Viscosity (CP):	@°F=	1.75	Differential Press	ure (PSI): _	14.9	Area Clas	ssification:	3	
Corrosion/Eros	ion Caused By: _		Differential Head	(Feet):	26.4	Other:	- · · · · · · · · · · · · · · · · · · ·		
Remarks:			NPSH Available			Remarks:			
		 	Hydraulic Power			l			
		Р			eted By Manufactur	er)			
Proposal Curve	No.:		Minimum Continu	uous Flow (G	3PM):	NPSH Re	quired (Feet Water):		
Speed (RPM):			Thermal	Stabi	le	3% He	ad Drop		
Efficiency (%):			Max. Head Rated	imp. (Feet):	:	Suction S	pecified Speed:		
Rated Power (E	3HP):		Max. Power Rate	d Imp. (BHP):				
		CONSTRI	UCTION (To Be Co	ompleted By	Purchaser and Ma	nufacturer)	· · · · · ·		
NOZZLES	SIZE	PAT	ING F	ACING	LOCATION	1 —	C. CONNECTIONS	SIZE	TYPE
Suction						1	Drain	┼	
Discharge						- 	Vent Pressure Gage		
Casing Mount:		☐ Bracket	Impeller Diam	eter (Inches)				 	
Centerline	☐ Near Cntrl.	☐ Inline	Rated	Max		`	Warm Up		
Casing Split:	Axial	☐ Radial	Impeller Type:	□ Ope	n D Closed		Balance Line		
Casing Type:	☐ Diffuser	☐ Staggered	Imp. Suction:	Sing	ple Double	I	Packing:		
Single Volu	te Do	ouble Volute	Imp. Mount:	□ Btwi	n. Brgs 🗖 Overhui	ng	Manufacturer		
Max. Allowable	Pressure (PSIG):	:	,	. • .	□ cw □ ccw		Type		
1			Bearing (Type	•			Size/No. Rings _		
Į.	np Temp ssure (PSIG):					'	Mechanical Seal: API Class code _		
Lubrication Typ		□ API 614							
l _ ^	_	_	Coupling:				Manufacturer		
☐ Grease	☐ Ring Oil	Oil Mist					Model		
☐ Flood	☐ Flinger	☐ Pressure	Type/Mode	el le			Mfr. Code		

O Pump Mfr. O Driver Mfr. O Purchaser

O Cartridge Type Required

Gland Plate Taps Required for:

Gland Type/Mat'l.:_

Driver Half-Coupling Mounted By:

				NO.	BY DATE	1	VISION	SHEET NO.	 S-11	AEV	ı	
5 FLUOR I	DANIEL DATA SHEET			A =				DATE CONTRACT 04-03-89 8457				
U.S. Depa	artment of Energ Waste Vitrification	y Diant					***	TAG NO.	X-540-01	8		
l Richland.	Washington tract DE-AC06-8		20	\wedge				SPECIFICATION S	SECT NO.			
	EALLESS PUM		00					ORIG BY	15148 HKD	APF	PR'D	
						_		J. Janzen	SSL	<u> </u>		
	COMPLY WITH GEN	ERAL SPI				H-2-123362-19 1	SS 15148)	PUMP MATI	EDIAL C			
ne/	NITRIC ACID CON FEED PUMP		No. Moto	r Driven	·		-					
Service			Pump Ta	g No.		PX-540-018	— Casing		1316F 2			
Pump Mfr	· · · · · · · · · · · · · · · · · · ·		NITRIC	ACID			impelie	·				
Size & Type	·····		DECC	W FEED	PUMP			Parts				
No. Stages				_ 81-		SAME	No. Pu	No. Pumps Req1_				
Serial No.			Motor Ta	g No		UFACTURER	─ No. Tu	rbine Driven				
	_		Motor Pr	ovided B	y 		_		_			
	LIQUID				TING CON	DITIONS		SITE COND				
Name NITRIC A				(U.S. GF		41.95		(°F): Max				
PUIASSIUM P	PERMANGANATE (0.7	576 WY	4			ated 41.25		ımid. (%): Max		Min		
Pumping Temperat	, ,				re (PSIG): .		1 _	e (Feet):	_			
	Max Min			Pressure		47		O Indoor O Heater O Roof				
	77 °F= 1.00					ed 4.7	_	Outdoor O Unh	_			
Vapor Press. (PSIA					ıre (PSI): _			lassification:				
Viscosity (CP): @	°F=				(Feet):		Other:					
Corrosion/Erosion	Caused By:				Feet):		Remar	ks:				
Remarks:			Hydrauli	Power	(HP):	5.471	_	· · · · · · · · · · · · · · · · · · ·				
	<u> </u>	_				sted By Manufac		······································				
	0.:				ous Flow (0			Required (Feet Wate	•		—	
Speed (RPM):			Therm	al	Stabi		3%	Head Drop				
Efficiency (%):			Max. Hea	d Rated	imp. (Feet).		Suction	Specified Speed: .				
Rated Power (BHP					Imp. (BHP		_					
						Purchaser and	_			T		
NOZZLES	SIZE	RA1	ring	FA	CING	LOCATION	⊣ ⊦'	VISC. CONNECTION	ws s	IZE	TYPE	
Suction Discharge						<u> </u>	\dashv \vdash	Drain Vent			i	
Casing Mount:	least D	Bracket	imaeli	er Dieme	rter (Inches)	<u> </u>	一	Pressure Gage			<u> </u>	
1		nline	•	ted	, ,			Warm Up				
		Radial		er Type:	_	_	_	Balance Line				

Proposal Curve	No.:		Minimum Continuous Flow (GPM):				NPSH Required (Feet Water):				
Speed (RPM): .			Thermal Stable				3% Head Drop				
Efficiency (%):			Max. Head Rated	i imp. (Feet).	:	Suctio	uction Specified Speed:				
Rated Power (E	HP):	I	Max. Power Rate	d Imp. (BHP):						
					Purchaser and Man	ufactur	er)				
NOZZLES	SIZE	RATIN	NG F	ACING	LOCATION		MISC. CONNECTIONS	SIZE	TYPE		
Suction							Drain				
Discharge							Vent				
Casing Mount:	Foot	☐ Bracket	Impeller Diam	eter (Inches)	<u></u>	Ĺ	Pressure Gage				
Centerline	Near Cntrl.	☐ Inline	Rated	Max	Min		Warm Up				
Casing Split:	Axial	Radial	Impeller Type: 🔲 Open 🔲 Closed				Balance Line				
Casing Type:	☐ Diffuser	☐ Staggered	Imp. Suction: Single Double				Packing:				
Single Volut	e □ Do	uble Volute	Imp. Mount:	☐ Bt wi	n. Brgs 🔲 Overhung	g	Manufacturer				
	Pressure (PSIG):		Rotation (Cou	pling End):	□cw □ccw		Туре				
At 60°F			Bearing (Type	/Number):			Size/No. Rings				
	•						Mechanical Seal:				
Hydro Test Pre	ssure (PSIG):		Thrust				API Class code				
Lubrication Typ	e:	□ API 614	Coupling:				Manufacturer				
Grease	Ring Oil	Oil Mist	Manufactu	rer			Model				
Flood	☐ Flinger	Pressure	Type/Mode	ــــــــــــــــــــــــــــــــــــــ			Mfr. Code				
			Driver Half-Co	upling Mour	nted By:		Cartridge Type Required				
			O Pump Mfr.	O Driver M	fr. O Purchaser		Gland Type/Mat'l.:				
							Gland Plate Taps Requ	ired for:			

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				A1	IACHME	VI A			Tallace in a				
7 -				NO.	DATE		REVISIO	N	SHEET NO.	- l	ÆV. O		
FLUOR I	DANIEL					ऱ			DATE	CONTRA	.CT		
	DATA SHEET			Δ \vdash		Ⅎ			03-22-89 TAG NO.	8-	15734		
l Hanford V	artment of Energ Vaste Vitrificatio	gy n Plant				3			PX	540-021			
Richland, DOE Con	Washington tract DE-AC06-8	36RL108	38						SPECIFICATION SECT NO.				
QF	ALLESS PUM	PS		$\triangle \vdash$					ORIG BY CHI		PPR'D		
				Δ E					J. Janzen	SSL_			
ALL ITEMS SHALL	COMPLY WITH GEN	IERAL SPE	CIFICATION	ON SHEE	<u>:</u> τs:		362-18 (SS 1	5148)					
מבייני	OKALIC ACID ITAMINATION FEED	PUMP	No. Moto	r Driven			Carina	PUMP MATE					
Service			Pump Ta	g No.		PX-540-	021	Casing Impeller	316L				
					ECONTAMI	NATION		•	arts316L S	 S.S.			
Size & Type			FEED	<u>PUMP</u>									
No. Stages			Motor Tag	g No		SAME			Req1				
Serial No	· · · · · · · · · · · · · · · · · · ·	Motor Pro	ovided B	y	UFACTU	RER	NO. IUIDIN	Driven					
	LIQUID			OPER/	ATING CON	DITIONS			SITE CONDITI	ONS			
Name _OXALIC A	CID (10% BY WEIG	TD	Capacity	(U.S. G				Temp. (°F):	Max	Min			
Pumping Temperat	ture (°F):					ated		Rel. Humid	l. (%): Max	Min			
	Max. <u>150</u> Min		Discharg	e Pressu	re (PSIG):	23	1.7	Altitude (Fe	oet):				
	77 °F= 1.0	33	Suction I					○ Indo	or O Heate	○ Ro	of		
Vapor Press. (PSIA		Max.		Ra			_	door OUnhea	-	ın .			
i			Differenti	al Pressu	ure (PSI): _			Area Class	ification:3				
Corrosion/Erosion	Caused By:				(Feet):		 -	Other:					
Remarks:			NPSH A	/ailable (Feet):			Remarks: _					
			Hydraulid	Power	(HP):	5.462							
		P	ERFORMA	NCE (To	Be Compl	eted By	Manufacture	<u>)</u>					
Proposal Curve No).:		Minimum	Continu	ous Flow (GPM):		NPSH Requ	uired (Feet Water)				
l ' ' '				-	Stab	_			d Drop				
Efficiency (%):			Max. Hea	d Rated	Imp. (Feet)	: ——		Suction Specified Speed:					
Rated Power (BHP	<u>): </u>												
				o Be Co	mpleted By	Purchas	er and Man						
NOZZLES	SIZE	RAT	ING	FA	CING	LOC	CATION		. CONNECTIONS	SIZE	TYPE		
Suction	<u> </u>	 -							ain	+	 		
Discharge	<u> </u>					<u> </u>			ent essure Gage	 	 		
Casing Mount:		Bracket Inline	•		eter (Inches)		Aim	<u> </u>	arm Up	+	+		
i <u> </u>	_	nune Radial			Max Ope		Ain. ——— Closed		aiance Line	+	 -		
Casing Split:			•	er Type: Suction:	☐ Sing		Double	<u> </u>	icking:				
I		Staggered	•						•				
Single Volute	Double V	Olute	Imp. N			-	Overhung	9	Manufacturer				
Max. Allowable Pre	essure (PSIG):			-	oling End): Number):	III CW	□ CCW		Type Size/No. Rings _				
	emp			•	•			м	echanical Seal:				
1	e (PSIG):								API Class code ,				
Lubrication Type:		API 614	Coupl						Manufacturer				
Grease [Oil Mist	Manufacturer											
		Pressure	Tyr	e/Model				Mfr. Code					
Remarks:			-	pling Mou	-		Cartridge Type Required						
		O Pump Mfr. O Driver Mfr. O Purchaser					Gland Type/Mat'l.:						
- 					÷	_			and Plate Taps Re				
105\OS\101\207\845718	96.MIS/WP51-01/26/93 11:	36am	0	= By Pu	<u>irchaser</u>] <u>= By</u> t	Wfr./Purchase	er O Quer	ch O Flush O	Drain ()	Vent		

ATTACHMENT B EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

		MAXIMU	M ENVELOPE (1	nches)
TAG NUMBER	MODEL NUMBER*	LENGTH	WIDTH	HEIGHT
PX-520-001	A21 Kontro-Arrange 1-1/2 x 1 x 8	52	21	16
PX-520-003	A21 Kontro-Arrange 1-1/2 x 1 x 8	52	21	16
PX-520-004	Kontro-Arrange 1-1/2 x 1 x 6	32	18	12
PX-520-006	Kontro-Arrange 1-1/2 x 1 x 6	32	18	12
PX-520-009	A21 Kontro-Arrange 1-1/2 x 1 x 8	52	21	16
PX-540-002	Viking series 897-GG-R Drive	58	14.25	15
PX-540-004	Kontro-Arrange 1 x 1 x 6	18	15	13
PX-540-006	Kontro-Arrange 1 x 1 x 6	18	15	13
PX-540-009	Kontro-Arrange 1 x 1 x 6	18	15	13
PX-540-015	Kontro-Arrange 1 x 1 x 6	18	15	13
PX-540-018	H53EH Kontro 3 x 2	69	20	73
PX-540-021	H53EH Kontro 3 x 2	69	20	73
PX-540-023	TC18 Kontro 1 x 1	20	10.5	12.5
PX-540-025	TC18 Kontro 1 x 1	29	10.5	12.5
PX-540-029	Kontro-Arrange 1 x 1 x 5	28	19	13
PX-540-036	Kontro-Arrange 1 x 1 x 5	28	19	13
PX-540-037	A21 Kontro-Arrange 1-1/2 x 1 x 8	52	21	16

^{*} Equipment shall be of this model number or equal.

DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

2022

SECTION 15196
IDENTIFICATION AND TAGGING METHODS

APPROVED FOR CONSTRUCTION

FOR MECHANICAL EQUIPMENT B-595-P-P33B-15196

REVISION	0
ISSUE DATE	2-2-93

ORIGINATOR:

CHECKER:

J. D. Lowerre, Tech. Writer (Mech.) Date

APPROVED BY:

R.B. Erickson

Lead Discipline Engineer

1-26-93

Date

U.S. DEPARTMENT OF ENERGY Hanford Waste Vitrification Plant

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

Rev. 0

SECTION 15196 IDENTIFICATION AND TAGGING METHODS FOR MECHANICAL EQUIPMENT B-595-P-P33B-15196

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PART	2 PRO 2.1 2.2	DUCTS MATER FABRI	IALS A	ND E	QUIPI MANI	MENT	•			•		•				•								2 2 3
PART	3 EXE	CUTION		• •			•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	7
ATTAC	CHMENTS																							
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Richland, Washington DOE Contract DE-AC06-86RL10838

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SECTION 15196 IDENTIFICATION AND TAGGING METHODS FOR MECHANICAL EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

This specification section describes the technical requirements for the design, material and fabrication of permanent and temporary identification methods applicable to manufactured or procured parts, subassemblies and assemblies.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A13.1

1981 (Rev. 85) Scheme for the Identification of Piping Systems

INSTRUMENT SOCIETY OF AMERICA (ISA)

ISA RP60.6

1984 Nameplates, Labels and Tags for Control Centers, Recommended Practice

MILITARY STANDARDS

MIL-STD-889B

1988 (Notice 2) Dissimilar Metals

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA 29 CFR 1910.96

1990 Ionizing Radiation

1.3 RELATED REQUIREMENTS

(Not Used)

1.4 **DEFINITIONS**

(Not Used)

1.5 SYSTEM DESCRIPTION

(Not Used)

SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

- 1.6.1 Seller shall submit material safety data sheets for Buyer approval. These data sheets shall certify that all materials used for the application and removal of marking on corrosion-resistant, stainless steel and some nickel-based alloys shall be free of halides and low melting-point elements to the extent specified in Paragraph 2.1.1.1 B.
- Seller shall submit certification of the processes used for permanent marking. Tools used to apply permanent marking and the resultant mark shall be in accordance with the applicable requirements in Paragraph 2.2. To preclude repeated examination of production marking, tools and sample markings made by said tools shall be examined to determine accordance with applicable requirements.
- 1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

(Not Used)

PART 2 PRODUCTS

- 2.1 MATERIALS AND EQUIPMENT
- 2.1.1 Materials
- 2.1.1.1 Material Compatibility Materials used for permanent or temporary marking or for the removal of markings shall be physically and chemically compatible with the material to which the markings will be applied or removed. The following shall be avoided:
 - A. The use of dissimilar metals in permanent contact as defined in MIL-STD-889B.
 - B. The use on corrosion-resistant, stainless steel and some nickel-base alloys of materials containing more than:
 - one-half percent by weight of halides (chlorides and fluorides),
 - 2) one-half percent by weight of sulfur, and

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- a sum total of one-half percent by weight of low 3) melting-point elements such as cadmium, aluminum, lead, zinc and mercury.
- Permanent marking of critical stainless steel components C. using labels, tape, paint or other marking materials that could cause crevice corrosion.

2.2 FABRICATION AND MANUFACTURE

- 2.2.1 Requirements
- Cleanliness Surfaces to be marked shall be cleaned of oil, 2.2.1.1 grease, dirt, corrosion or any other material that would adversely affect the application or adhesion of the marking.
- Legibility All markings shall be clearly legible. Color 2.2.1.2 markings, including black and white, shall contrast with the color of the surface to which it is applied. Freehand lettering for the purpose of temporary marking shall be in the printed form and be uppercase (caps).
- Permanent Identification Methods 2.2.2

Type	1	Vibratory Marking
Type		Die Stamping
Type		Raised marking forged or cast into the surface
Type	4	Recessed marking forged or cast into the surface
Type	5	Electrochemical etch
Type		Nameplate
Type	7	Self-adhesive label
Type	8	Painting
Type		Packaging
Type		Tagging

- Type 1: Vibratory Marking Vibrating tools shall be fitted with 2.2.2.1 a carbide marking point or equivalent. Tools shall be adjusted to produce a shallow, rounded impression 0.003 to .101 inch in depth. The marking tool tip minimum radius shall be 0.005 inch. The size (height) of characters produced by vibratory marking shall be selected within the range of 1/16 to 1/2 inch.
- Type 2: Die Stamping Die stamps shall be low-stress type 2.2.2.2 stamps. The minimum tip radius of the dies shall be in accordance with the following character sizes:

Character Size (inch)	Minimum Tip Radius (inch)
1/16	0.005
3/32	0.006
1/8	0.007
3/16	0.008
1/4	0.010
3/8	0.012
1/2	0.014

- A. Impression depth shall not exceed 0.10 inch.
- B. Die stamp marking shall be applied to a flange, an integrally-cast or forged boss or pad, the base or support of the item or other visible low-stress location.
- C. The material thickness of an item to be marked shall not be reduced by die stamping to less than the minimum specified on the component drawing or specification (if available).
- 2.2.2.3 Types 3 and 4: Raised/Recessed Markings Raised or recessed identification markings that are cast into the surface of the item are acceptable. Recessed markings shall not reduce the material thickness of an item to less than the minimum specified on the component drawing or specification. The size of forged or cast characters called out on the drawing or specification shall only be limited by the space available, but shall in no case be less than 0.09 inch in height.
- 2.2.2.4 Type 5: Electrochemical Etching The electrolyte and neutralizer used for electrochemical etching shall be compatible with the material to be marked. The depth of etching shall be no greater than 0.5 percent of the material thickness or 0.003 inch, whichever is less. The size of characters produced by electrochemical etching shall be selected within the range of 1/16 to 1/2 inch. However, the recommended minimum size is 0.1 inch to accommodate typing applications.

2.2.2.5 Type 6: Nameplates

A. The physical requirements (e.g., material, nameplate dimensions, character size and arrangement) for metal nameplates shall either be detailed on the applicable drawing or specification; or defined by reference to an applicable nameplate standard, specification or drawing. Metal nameplates shall be corrosion-resistant. They shall contain not less than the following information:

Equipment description Purchase order number Equipment item number

P.O. item number
Manufacturer's name
Manufacturer's model number
Manufacturer's serial number
Rated capacity
Size and type
Year built
Project identification CVI number (to be marked by Buyer)

A typical metal nameplate layout is shown in Attachment A.

- B. When attached by welding, metal nameplates shall be welded in accordance with the welding requirements applicable to the item. The attachment method and location on the item of either nameplate type shall be established on the basis of stress imposed on the item. The method shall consider possible crevice corrosion between the nameplate and the item surface. If the welded nameplate is removed, the affected area shall be tested in accordance with the welding requirements applicable to the item.
- C. When used, plastic nameplates shall be specified on the item drawing or specification in accordance with Attachment B. This shall include nameplate size, character size and method of attachment.
- 2.2.2.6 Type 7: Self-Adhesive Labels Self-adhesive labels may be used for identification provided they are in accordance with the requirements specified in Paragraph 2.1.1.1. These labels should be placed in easily-visible locations. When used to mark components in systems such as piping or electrical systems, or used as regulatory marking, self-adhesive labels shall be in accordance with applicable government, society or industry standards and codes. For example:
 - A. When marking a piping system, a recognized standard such as ANSI A13.1 shall be invoked on the applicable drawing/specification along with this specification section.
 - B. If labels are used to identify system or component radiation hazards, a standard such as OSHA 29 CFR Section 1910.96 shall be specified on the applicable drawing/specification along with this specification section.
- 2.2.2.7 Type 8: Painting Paints suitable for the purpose and/or as specified shall be used to apply stenciled markings to items (see Paragraphs 2.1.1.1 and 2.2.1.2). These markings should be placed in easily-visible locations. Stenciled markings may be applied using a template or silkscreen. The size of the stenciled characters specified on the drawing/specification shall be selected within the range of 1/3 to 3 inches. The color and type

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of paint to be used shall also be in accordance with the drawing/specification. Crafted (freehand sign painted) application of marking in lieu of stenciling is acceptable with due consideration being given to the higher cost involved.

- Type 9: Packaging Identical items too small to be identified 2.2.2.8 individually may be packaged in a box or bag marked with the item identification as shown in Paragraph 2.2.2.9 A.
- Type 10: Tagging 2.2.2.9
 - Tags shall be of corrosion-resistant metal. They shall be impression-stamped with not less than the following information:

Purchase order number Purchase order item number Equipment item number CVI number (to be marked by Buyer)

A typical tag layout is shown in Attachment A.

- Tags shall be attached to the component they identify with В. stainless steel wire. Tagging is done in addition to the equipment nameplate. Equipment shipped in fully-enclosed containers shall have the information from A. clearly marked on the container exterior.
- Miscellaneous parts shall be tagged or marked with the С. equipment item number for which they are intended.
- Equipment which contains insulating oils, antifreeze D. solutions or other liquids shall be prominently tagged at every opening. Tags shall indicate the nature of the contents and precautions for shipping and storage.
- 2.2.3 Temporary Identification Methods

Type A	Rubber stamp and ink
Type B	Rubber roller or wheel and ink
Type C	Felt-tip marking pen
Type D	Removable self-adhesive label or tape
Type E	Label attached with removable tape
Type F	Removable tag
Type G	Packaging
Type H	Scribing tool
Type J	Paint stick
Type K	Metal tag

Inks - Inks used for all type of temporary markings including 2.2.3.1 felt-tipped pens, rubber stamps, rubber roller and rubber wheel

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> shall be in accordance with the requirements of Paragraph 2.1.1.1 B.

- Self-Adhesive Labels and Tape The adhesives of self-adhesive 2.2.3.2 labels and tape used for temporary marking shall be in accordance with the requirements of Paragraph 2.1.1.1.
- Tagging Items not suited for other methods of identification may 2.2.3.3 be tagged. Tags and attaching materials shall be compatible with the item material in accordance with Paragraphs 2.1.1.1 A and 2.1.1.1 B. Materials used for temporary identification tagging shall be selected on the same basis as for permanent identification tagging (see Paragraph 2.2.2.9).
- Packaging Packaging requirements for temporary identification 2.2.3.4 shall be the same as for permanent identification (see Paragraph 2.2.2.8).
- Scribing Tool Scribing tools may be used for temporary 2.2.3.5 identification during fabrication or construction provided such marking is not applied to critical surfaces such as finished, machined or sealing surfaces.
- Removal of Temporary Marking All temporary marking shall be 2.2.3.6 removed from stainless steel and corrosion-resistant material surfaces after fabrication. All visible traces shall be removed. Solvent used for marking removal shall be in accordance with Paragraph 2.1.1.1 B.
- 2.2.4 Testing
- Visual Inspection Item surfaces and marking shall be visually 2.2.4.1 inspected to determine accordance with the applicable requirements specified in Paragraphs 2.2.1.1 and 2.2.1.2.

PART 3 EXECUTION

(Not Used)

FND OF SECTION

ATTACHMENT A LAYOUT EXHIBITS (TYPICAL)

EXHIBIT 1. NAMEPLATE LAYOUT

P.O. NUMBER ITEM NUMBER

SERIAL NUMBER MODEL NUMBER

EQUIPMENT DESCRIPTION

MANUFACTURED BY

SIZE TYPE

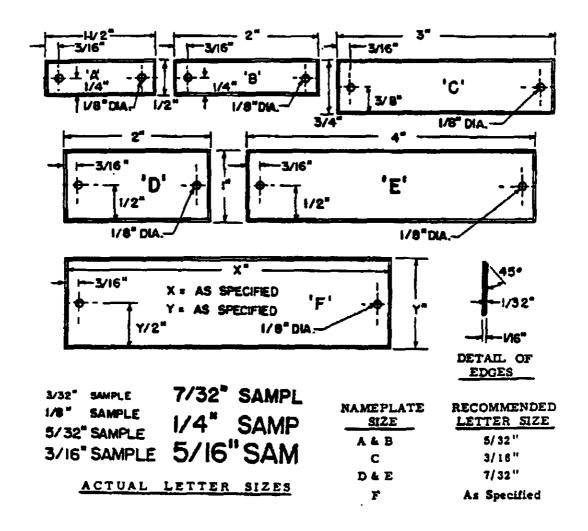
RATED CAPACITY YEAR BUILT

PROJECT

EXHIBIT 2. TAG LAYOUT

P.O. NUMBER
P.O. ITEM NUMBER
EQUIPMENT ITEM NUMBER

ATTACHMENT B NAMEPLATE DATA



U.S. DEPARTMENT OF ENERGY

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

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NOTES:

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- 1. Unless otherwise specified, nameplate material shall be laminated plastic stock, 1/8-inch thick. Surface shall be white. Core shall be black.
- 2. Nameplate edges shall be beveled in accordance with the figure. They shall be smooth and without burrs. Letters shall be sharp and clear, similar to the style depicted in the figure.
- 3. 4-40 x 3/8 binding head self-tapping machine screws, pullstem rivets, 4-40 machine screws or 1/8-inch diameter drive rivets shall be used to fasten nameplates. Fastener materials shall be compatible with base materials in accordance with equipment specifications. Contact adhesive or silicon adhesive may be used as an alternative fastening method where screws/rivets are not desirable.
- 4. The nameplate's usable area, letter size and spacing shall be in accordance with ISA RP60.6, Appendices A-2 and A-3.

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 15648
PLATE HEAT EXCHANGERS
B-595-P-P33B-15648

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE $2-2-93$	WAPA YES NO X QUALITY LEVEL I II X SAFETY CLASS 1 2 3 X 4
ORIGINATOR:	CHECKER:
J. J. Ickkhan, Mechanical Eng.	Date D A. Buzzelli, tead bisc Checker Dat
APPROVED BY:	
R.B. Euckson	1-26-93
C. J. Divona Lead Disc	ipline Engineer Date

SECTION 15648 PLATE HEAT EXCHANGERS B-595-P-P33B-15648

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SECTION 15648 **PLATE HEAT EXCHANGERS**

PART 1 GENERAL

SUMMARY 1.1

This specification section covers the minimum technical requirements for design, fabrication and testing of the plate heat exchangers. These heat exchangers will be installed in the Hanford Waste Vitrification Plant in Richland, Washington.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.5

1988 Pipe Flanges and Flanged Fittings

ANSI B16.11

1980 Forged Steel Fittings, Socket Welding

and Threaded

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A480/A480M

1991 (Rev. A) General Requirements for Flat Rolled Stainless and Heat Resisting

Steel Plate, Sheet, and Strip

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) Boiler and Pressure Vessel Code

ASME Section II.

1989 Material Specifications - Ferrous

Part A Materials

ASME Section V

1989 Nondestructive Examination

ASME Section VIII,

1989 Rules for Construction of

Division 1

of Pressure Vessels

ASME Section IX

1989 Welding and Brazing Qualification

AMERICAN WELDING SOCIETY, INC. (AWS)

AWS D1.1

1990 Structural Welding Code Steel, 12th

Edition

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STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-6

1989 Surface Preparation Specification No. 6, Commercial Blast Cleaning

1.3 **RELATED REQUIREMENTS**

Specification Section 01730 Operation and Maintenance Data

Specification Section 05063 Welding Pressure Vessels

Specification Section 13252 Precautions for Fabrication,

Handling and Storage of Stainless

Steel and Nickel Alloys

Specification Section 15196

Identification and Tagging Methods

for Mechanical Equipment

1.4 **DEFINITIONS**

FAT - Factory Acceptance Test

NDE - Nondestructive Examination

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 **SUBMITTALS**

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 General Arrangement Drawings

General arrangement or outline drawings shall be submitted. These drawings shall contain the following information:

- Service, item number, project name and location, purchase Α. order number and Manufacturer's shop order number.
- All overall dimensions, diameters and elevations of all В. assemblies and subassemblies. This shall include all clearances which must be maintained.
- C. Thickness of all materials used (including supports).
- D. Locations and details of all structural and attachment welds.

- E. Location (elevation, projection and orientation) of every connection to the equipment (i.e., nozzles, brackets, clips, supports, lifting lugs, etc.). Location of nameplates.
- F. Location and size of all bolts and bolt-slotted holes for exchanger support.

1.6.2 Detail Drawings

Shop fabrication or cross sectional and other detail drawings shall be submitted for Buyer approval. These drawings shall contain the following information:

- A. Full dimensions of all parts and subassemblies. Tolerances and finishes required wherever applicable.
- B. A complete list of materials used for manufacture of the plate heat exchanger. This list shall include certifications or degree of testing if this forms part of the material specifications. This is required if the assembly drawings list the materials used in general terms only.
- C. Gasket sketches for all joints. These shall provide dimensions, number required, type and materials.
- 1.6.3 Completed specification Data Sheets, reflecting the design parameters shown on Data Sheets P33B-DS-1 and DS-2 (Attachment A).
- 1.6.4 Mechanical design calculations for the frame assembly shall be submitted. These calculations shall be complete, with all steps and data identified, to show accordance with the contract specifications and its supplements, as well as all applicable codes and standards. The calculations shall be complete to permit second-party review. Where computers are used for code calculations, all assumptions and input data shall be supplied together with the computer-generated output.
- 1.6.5 Code Data Book shall include the following:
 - A. Certified mill test reports. These reports shall state the specification to which the material complies, the chemical analysis, physical properties and any heat treatment the material was given.
 - B. Manufacturer Data Report, Forms U-1, U-1A or U-2; in accordance with ASME Section VIII, Division 1.
 - Nameplate rub-off.
 - D. Hydrotest chart.

- E. Nondestructive examination (NDE) test results.
- F. "As-Built" Data Sheets.
- 1.6.6 Welding submittals shall be in accordance with ASME Section IX, AWS D1.1 and Specification Section 05063.
- 1.6.7 Assembly Instruction drawings and complete installation manuals shall be submitted for the plate heat exchanger.
- 1.6.8 Factory Acceptance Tests (FATs) as defined in Paragraph 2.5, and FAT report.
- 1.6.9 Spare Parts List

A list of recommended spare parts for one (1) year's routine operation shall be supplied. This list shall include sufficient data to permit procurement from the original manufacturer or any subsupplier.

- 1.6.10 Inspection and checklist shall be submitted in accordance with Paragraph 2.5.3.
- 1.6.11 Operation and Maintenance Manuals

Seller shall provide operation and maintenance manuals. These manuals shall fully detail sequences of disassembly, repair, adjustment, reassembly, lubrication and troubleshooting. Troubleshooting sections shall include fault trees to guide both mechanical and electrical diagnostics. The manuals shall include reduced-size 11x17 copies of any assembly drawing, subassembly drawing or parts list needed for routine maintenance and overhaul. This data shall be submitted in accordance with Specification Section 01730.

1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

- 1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS
- 1.8.1 Climatic and Site Environmental Conditions
 - A. Site Elevation level

714 feet above sea

B. Barometric Pressure

14.3 psia

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C.	Outside	Design	Temperature

1)	Maximum	Design	Temperature	110°F
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- 2) Minimum Design Temperature -20°F
- 3) Wet Bulb Design Temperature 68°F

1.8.2 Operating Environment

Α.	Normal	Temperature	60°F to 104°F
Λ.	I TO I III U I	I Chibe i a care	00 1 10 10 1

В. Maximum Temperature 104°F

С. Not controlled Relative Humidity

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 **Materials**

Plate materials shall be Type 304L stainless steel in accordance with ASTM A480/A480M. The material specifications, grade and condition shall be as specified on the exchanger data sheets. All pressure-retaining materials shall be in accordance with ASME Section II. Part A.

2.1.2 Equipment

The following requirements shall apply to all plate-type heat exchangers furnished in accordance with this specification section. Special heat exchanger requirements established by Data Sheets P33B-DS-1 and DS-2 (Attachment A).

- Seller shall guarantee all plate heat exchangers against defective design, material and workmanship. Seller shall also quarantee exchanger performance with regard to capacity, heat duty and pressure drop in accordance with the process conditions specified on the individual data sheets.
- В. Process and Thermal Design
 - 1) Seller shall thermally and hydraulically design the exchangers to meet the requirements listed on Data Sheets P33B-DS-1 and DS-2 (Attachment A).
 - 2) Cleanliness factors or fouling resistances to be used in the thermal design shall be specified on the data sheets.

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- The exchanger frame shall be designed to permit future installation of additional plates. This additional capacity shall be not less than 20 percent.
- 4) The velocity through stainless steel exchanger inlet and outlet nozzles shall not be greater than 15 feet per second.
- 5) Pressure drop shall be calculated based on the clean condition.
- The combined pressure drop attributed to the entrance and exit flow ports shall not exceed 50 percent of the total calculated pressure drop.

2.2 FABRICATION AND MANUFACTURE

- 2.2.1 Plates
- 2.2.1.1 Plates shall be designed such that each plate can withstand full maximum operating pressure with no pressure on the adjacent plates. The minimum thickness of plates before pressing shall be 0.024 inch nominal.
- 2.2.1.2 Design of plates shall permit metal-to-metal contact between adjacent plates.
- 2.2.1.3 Gasket grooves shall be designed to contain gaskets within the grooves, provide full gasket support and prevent over-compression of the gaskets. This shall be accomplished by metal-to-metal plate contact outboard of the gasket grooves.
- 2.2.1.4 Port holes not feeding passes between plates shall be fully-gasketed and vented to the atmosphere.
- 2.2.1.5 Plates shall be fully supported from the top carrying bar. They shall be guided only by the bottom bar with reinforced slots. Slots shall be an integral part of the plate.
- 2.2.1.6 End plates shall be furnished at both the fixed and movable covers. These end plates shall provide sealing of the first and last flow passes and provide support to the adjacent plates.
- 2.2.2 Plate Gaskets
- 2.2.2.1 Gaskets shall be compressed to achieve metal-to-metal contact between plates during operation.
- 2.2.2.2 An adhesive compound compatible with the gasket material and of sufficient thickness to ensure bond strength between plate and gasket shall be applied to the plate gasket groove surface.

2.2.2.3	Gasket plate surface shall be thoroughly cleaned by means of solvent cleaning or electro-polishing. Surface shall be dried before adhesive application. Emery cloth or abrasive powders shall not be used to clean gasket grooves.
2.2.2.4	The adhesive (with gasket in place) shall be allowed to cure for not less than one hour. The curing temperature shall be not less that the normal operating temperature. Low-pressure saturated steam or hot water may be used as the heating media. After curing, all gaskets shall be checked. Deformed gaskets shall be replaced and the curing operation repeated.
2.2.2.5	All gaskets except for those between end plates and the head shall be identical. One-piece gaskets are required.
2.2.2.6	Relieving grooves shall be provided in the outside gasket in those locations where an internal gasket is used. The relieving grooves should be located such that no contamination of liquids can occur.
2.2.3	Fixed and Movable Covers
2.2.3.1	For single pass counter-current designs, all nozzle connections shall be located in the fixed cover.
2.2.3.2	Slotted holes for compression bolts shall be uniformly distributed around the periphery of both fixed and movable covers.
2.2.3.3	The movable covers shall be supported from the upper carrying bars by means of bearings. Covers shall be guided by the bottom bars.
2.2.3.4	Fixed or movable covers shall not be provided with stiffeners to compensate for thickness.
2.2.4	Compression Bolts and Nuts
2.2.4.1	The bolt length shall accommodate the additional plates provided for in Paragraph 2.1.2 $B(3)$.
2.2.4.2	The bolts shall have a minimum diameter of not less than 1/2 inch.
2.2.4.3	Nuts at the fixed cover end shall be captive. Washers shall be provided at both ends of compression bolts.
2.2.5	Top Carrying Bar
2.2.5.1	A smooth surface shall be provided along the length of the carrying bar to allow easy movement of the movable covers.
2.2.5.2	The carrying bar shall be designed to support 1.5 times the weight of the flooded exchanger.

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2.2.6 Nozzles ar	nd Attachments
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- 2.2.6.1 Bolt holes of flanged nozzles shall straddle the centerline.
- 2.2.6.2 Flanged fittings and nozzles shall be in accordance with ANSI B16.5.
- 2.2.6.3 Forged steel lap joint flanges shall be used with all stub ends.
 All welds shall be examined by liquid penetrant after all welding and machining operations are complete.
- 2.2.6.4 Vent and drain connections shall be provided at the high and low points of each exchanger.
- 2.2.6.5 All process nozzles shall have a pipe size of not less than 1-1/2 inch. These nozzles shall be flanged. All auxiliary connections shall be flanged or threaded as specified on Data Sheets P33B-DS-1 and DS-2 (Attachment A). Auxiliary connections shall be blind flanged or plugged as required.
- 2.2.6.6 Standard 6000-pound couplings shall be used for threaded connections. Bar stock plugs shall be in accordance with ANSI B16.11. These plugs shall be of the round head type.
- 2.2.6.7 Coupling orientations and projections shall not interfere with nozzle flange bolting wherever couplings are required in exchanger nozzles.
- 2.2.7 Miscellaneous
- 2.2.7.1 The fixed cover end shall be supported by either two legs or one leg extending along the entire width of the exchanger. The other end shall have only one support leg.
- 2.2.7.2 Exchanger shall be fully self-draining.
- 2.2.7.3 Lifting lugs shall be provided. They shall be designed to support twice the exchanger's maximum dry weight.
- 2.2.7.4 All plate exchangers shall bear an ASME Code Stamp.
- 2.2.8 Anchorage Provisions

The Melter Cooling Water Cooler EX-460-001A/B, shall have provisions to be anchored with a minimum of four 1/2 inch diameter bolts. Bolt holes shall be 11/16 inch diameter. The process Cooling Water Cooler EX-450-001A/B, shall have provisions to be anchored with a minimum of four 5/8 inch diameter bolts. Bolt holes shall be 13/16 inch diameter.

2.2.9 Envelope

The maximum available envelope for the plate heat exchangers and the model number or equal are shown in Attachment B.

2.3 LABELING

Labeling shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6. This shall be in addition to the manufacturer's identification plate.

2.4 COATINGS

After completion of all fabrication procedures the external surfaces of each heat exchanger shall be thoroughly cleaned of all foreign material, including rust, in accordance with SSPC SP-6. Manufacturer's standard prime and finish paint or coatings shall be applied. Stainless steel surfaces shall not be painted unless specified otherwise.

2.5 INSPECTION AND FACTORY ACCEPTANCE TESTS (FATs)

2.5.1 Nondestructive Examination (NDE)

- A. Nondestructive examination methods and acceptance shall be in accordance both with ASME Section V and Specification Section 05063.
- B. The specific requirements for nondestructive examination shall be as shown on Seller's drawings by NDE symbols.

2.5.2 Pressure Tests

- A. The plate heat exchanger shall be hydrostatically tested at 1.5 times the design pressure corrected for temperature. The hydrotest procedure shall be in accordance with ASME Section VIII, Division 1, Paragraph UG-99(b). All tests shall be made in the presence of a designated inspector and with his/her specific authorization. Test pressure shall be maintained for not less than one hour.
- B. The test medium for hydrostatic testing shall be in accordance with Specification Section 13252.
- C. Additional welding on the exchanger shall not be permitted after hydrostatic tests are complete.
- D. The exchanger shall be thoroughly drained and dried after hydrostatic testing.

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Rev. 0

2.5.3 Shop Inspection

- A. Seller shall perform shop inspections of the exchanger. Seller personnel who make inspections of the exchanger shall be qualified in accordance with ASME Section VIII, Division 1, Paragraph UG-91(a). The reference to the inspector in ASME Section VIII, Division 1, Paragraph UG-90 shall also apply to Seller.
- B. The alternative inspections in accordance with ASME Section VIII, Division 1, Paragraph UG-90(c-2) shall not be permitted.

2.6 PACKAGING

- 2.6.1 Preparation for shipment and packing shall be in accordance with seller's standards. At minimum, packaging shall provide protection against corrosion and damage during normal handling, shipping and storage. Minimum preparation shall include the requirements listed below.
- 2.6.2 Machined surfaces, threads, bearings and bearing housings shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- 2.6.3 Flanged openings shall be covered with wood or plastic protectors. Protectors shall be installed with a minimum of four (4) full diameter steel bolts and nuts of material compatible with the flange.
- 2.6.4 Threaded connections and tapped holes shall be capped or plugged to prevent thread damage. Compatible materials shall be used.
- 2.6.5 Plate heat exchanger shall be shipped fully assembled.
- 2.6.6 Bracing, supports and rigging connections shall be provided to prevent damaged during shipment, loading and unloading.
- 2.6.7 Separate or loose parts shall be completely boxed and attached to the main item to be shipped as a unit. All shipping boxes shall be identified by the Seller's order number, equipment number and equipment description.

PART 3 EXECUTION

(Not Used)

END OF SECTION

ATTACHMENT A

	NO. BY	Π	REVISION	SHEET NO.	REV.
ELLIOP DANIEL	A DATE	 		P33B-DS-1	0
FLUOR DANIEL		1		03-20-90	CONTRACT 845734
	\sim	ł		TAG NO	
U.S. Department of Energy Hanford Waste Vitrification Plant				EX-460-001A AND	EX-460-001B
Richland, Washington	 			SPECIFICATION SECT NO.	
DOE Contract DE-AC06-86RL10838		1		1564 FOR CLIENT USE	8
				ON CLIENT DISE	
PLATE HEAT EXCHANGER	[ORIG BY CHK!	D APPRID
TEATE TIEAT EXCHANGEN				S. Strausburg	KJM
SERVICE MELTER COOLING WATER COOLER		DR	AWING NO: #2-12335 SHT 1		
DUTY 0.42 X 10 ⁶ BTU/HR			CHANGER TYPE: HORIZONTAL	X VERTICAL	
VENDOR NO OF SECTIONS PER UNIT:			NUFACTURERS IDENTIFICATION I		
NO OF UNITS: 2 (ONE OPERATING - ONE SPARE)					
		_	HOT SIDE	COLDS	ine
FLUID CIRCULATED:			MELTER COOLING WATER	TOWER COOLI	
TOTAL FLUID:		.B/HR	210,000	21,00	
VAPOR:		B/HR	270,000	21,00	
LIQUID:			210.000		
STEAM:		B/HR	210,000	21,000	<u> </u>
		.B/HR			
NON CONDENSABLES:	L	B/HR			
FLUID VAPORIZED:	L	B/HR			
FLUID CONDENSED:	<u> </u>	B/HR			
M. W. VAPOR	IN	/٥٥			
TEMPERATURE IN:		°F	115	75	
TEMPERATURE OUT:		°F	113	95	
SP GR:				 	······································
SP HT:	BTU/LE	X°F			
TH COND:	BTU/HR/°F/F			- 	
VISCOSITY:	D10/110 1/1	CPS	·		
LATENT HEAT:	D.T.				
PRESSURE DROP (MAX ALLOW):	ВІ	U/LB			
PASSES:		PSI	10	0.1	
PASSAGES PER PASS:					
NO OF PLATES:					
HEAT TRANSFER AREA:		FT2			
LMTD			-		
OVERALL COEFF:				1	
FOULING:	Hrx°FxSq.Ft	/BTU	.0005	.001	
INLET PRESS (MAX):		PSI	50 (100 PSIG DESIGN)	58 (100 PSIG L	DECACAN
MECH	IANICAL DAT	A FO	R ONE UNIT		zuu,
FRAME SIZE	MATIONE DA	A 1 O	IT ONE ONL	<u> </u>	
WEIGHTS: PLATES: LB FRAME	·		LB TOTAL FLOODED:		
MAX PRESSURES: WORKING: 100 PS	SIG TEST:		PSI MAX WORKING	G TEMPERATURE: 15	<u>o</u>
CONNECTIONS: HOT SIDE 4 150# HF			COLD SIDE)# RF	
FRAME MATERIAL:			FINISH		
PLATE MATERIAL: 304L SS			FINISH		
GASKET MATERIAL;					
BUSH MATERIAL:					
THERMOMETERS:					
PRESSURE GAUGES:				.	
					
REMARKS: 1) MCW SIDE MAY BE SUBJECTED TO N	TRIC ACID DE	XONTA	MINATION		
2) TWO COOLERS ARE REQUIRED: 1 OP					
Ty OCCUPATION FOR REQUIRED: 1 UP	ur, i state				
				SAFETY CLASSIFIC	ATION_3
105\O\$\101\207\84571885.MIS-01/25/93 4:25pm			····	1	
				<u> </u>	

	ATTACHN	MENT A	
MALL MATERIAL PROPERTY.	NO. BY	REVISION	SHEET NO. REV.
	DATE		P338-DS-2 0 DATE CONTRACT
FLUOR DANIEL			05-08-90 845734
			TAG NO
U.S. Department of Energy Hanford Waste Vitrification Plant			EX-450-001 AND EX-450-001B SPECIFICATION SECT NO.
Richland, Washington			15648
DOE Contract DE-AC06-86RL10838			FOR CLIENT USE
			To true
PLATE HEAT EXCHANGER	\overline{A}		ORIG BY CHK'D APPR'D
		14.0.4000F(1.01)F(4.	
SERVICE PROCESS COOLING WATER COOLER BTU/HR		DRAWING NO: <u>H-2-12335H SHT 1</u> EXCHANGER TYPE: HORIZONTAL	X VERTICAL .
DUTY 27.3 X 10° BTU/HR VENDORBTU/HR		MANUFACTURERS IDENTIFICATION	
NO OF SECTIONS PER UNIT:			
NO OF UNITS: 2. TONE OPERATING - ONE SPARE)			2010 200
		HOT SIDE	COLD SIDE
FLUID CIRCULATED:		PROCESS COOLING WATER	COOLING TOWER WATER
TOTAL FLUID:	LB/HR	1,000,000	1,362,500
VAPOR:	LB/HR		
LIQUID:	LB/HR		
STEAM:	L8/HR		
NON CONDENSABLES:	LB/HR		
FLUID VAPORIZED:	LB/HR		
FLUID CONDENSED:	LB/HR		
M. W. VAPOR	IN/OUT		
TEMPERATURE IN:	°F	107.3	75
TEMPERATURE OUT:	°F.	80	95
SP GR:			
SP HT:	BTU/LB X °F		
TH COND:	BTU/HR/°F/FT ² /FT		
VISCOSITY:	CPS		
LATENT HEAT:	BTU/LB		
PRESSURE DROP (MAX ALLOW):	PSI	5	10
PASSES:			
PASSAGES PER PASS:			
NO OF PLATES:			
HEAT TRANSFER AREA:	FT ²		
LMTD			
OVERALL COEFF:			
FOULING:	Hrx*FxSq.Ft/BTU	.0005	.001
INLET PRESS (MAX):	PSI	7.5	30*
ME	CHANICAL DATA	A FOR ONE UNIT	
FRAME SIZE			
WEIGHTS: PLATES: LB FRA MAX PRESSURES: WORKING: 100/8	ME: PSIG TEST: .	LB TOTAL FLOODED: PSI MAX WORKI	NG TEMPERATURE: 150
CONNECTIONS: HOT SIDE 12 150 FF		COLD SIDE 10 150	NG TEMPERATURE: 150
FRAME MATERIAL:		FINISH	
PLATE MATERIAL: 304L SS		FINISH	

TOOLING.	111X 1 X0Q.1 (D.0	13355,	,,,,,					
INLET PRESS (MAX):	PSI	7.5	7.5 30*					
· · · · · · · · · · · · · · · · · · ·	MECHANICAL DATA F	OR ONE UNIT						
SIZE & TYPE FRAME MATERIAL: PLATE MATERIAL: GASKET MATERIAL: BUSH MATERIAL: EXTRAS THERMOMETERS:	LB FRAME: 1001-8 PSIG TEST: 12 150 F RF	FINISH	/LB ING TEMPERATURE: 150 °F					
REMARKS: *MINIMUM TSW PR	ESSURE IS 20.1 (REF. 3222-PR-4401) + 10 I	PSI = 30.1; USE 30 PSIG						
105/06/104/007/04574000 MIC 04/05/0	2 4 21		SAFETY CLASSIFICATION 3					
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	P33B-1564	18						

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Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

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ATTACHMENT B **EQUIPMENT MAXIMUM ENVELOPE AND** MODEL NUMBER OR EQUAL

		MAXIMUN	I ENVELOPE (i	nches)
TAG NUMBER	MODEL NUMBER*	LENGTH	WIDTH	HEIGHT
EX-450-001A	Alfa Laval Model A20-BFG	132	33	95
EX-450-001B	Alfa Laval Model A20-BFG	132	33	95
EX-460-001A	Alfa Laval Model B10-BFG	36	19	39
EX-460-001B	Alfa Laval Model B10-BFG	36	19	39

^{*} Equipment shall be of this model number or equal.

U.S. DEPARTMENT OF ENERGY
Hanford Waste Vitrification Plant
Richland, Washington
DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 15649 METERING PUMPS B-595-P-P33B-15649

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE $8-2-93$	WAPA YES NO X QUALITY LEVEL I II X SAFETY CLASS 1 2 3_X 4
ORIGINATOR: Serve Shiple - 1/26/93 J. J. Ichkhan, Mechanical Engineer Date	CHECKER: D. A. Buzzelli, lead Disc. Checker Date
APPROVED BY:	
R.B. Euckor C. J. Divona Lead Disciplin	ne Engineer Date

U.S. DEPARTMENT OF ENERGY

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

Rev. 0

SECTION 15649 METERING PUMPS B-595-P-P33B-15649

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<u>PART</u>																													<u>PAGE</u>
PART	1 GENI 1.1 1.2 1.3 1.4 1.5 1.6 1.7	ERAL . SUMMAI REFERI RELATI DEFIN SYSTEI SUBMI CLASS PROJE	RY . ENCES ED RI ITION M DES TTALS IFICA	S EQU NS SCF SCF	JIR RIP LON	EMI TIG	ENT ON	S	TÉI	MS		·	: :	· ·	201	NE!	·		•	•	•	•		•	•	•	•	•	1 1 1 2 2 2 2 2 3
PART	2 PROP 2.1 2.2 2.3 2.4 2.5 2.6	MATER FABRIO LABEL COATII TESTII PACKA	IALS CATIO ING NGS NG .	AA NC •	AN	EQI D I	JIP MAN	ME IUF	NT AC	TUI	RÉ ·	•	•	•	•	•		•	•		•		•	•	•	•	:	•	3 4 4 5 5 5
PART	3 EXE	CUTION	• •	•	٠	•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	6
ATTA	CHMENTS							٠																					

ATTACHMENT	<u>111£</u>
Α	DATA SHEETS
₿	EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC.
Advanced Technology Division
Fluor Contract 8457

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SECTION 15649 METERING PUMPS

PART 1 GENERAL

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1.1 SUMMARY

This specification section defines the technical requirements for the design, fabrication, inspection and testing of metering pumps. The metering pumps shall be of the controlled volume type.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A217/A217M

1991 Standard Specification for Steel Castings, Martensitic Stainless and Alloy for Pressure Containing Parts, Suitable for High Temperature Service

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
Boiler and Pressure Vessel Code

ASME Section VIII,

1989 Rules for Construction of

Division 1 Pressure Vessels

HYDRAULIC INSTITUTE (HI)

ΗI

1983 Standards for Centrifugal, Rotary and Reciprocating Pumps, 14th Edition

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-6

1989 Surface Preparation Specification No. 6, Commercial Blast Cleaning

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

Specification Section 15196 Identification and Tagging Methods

for Mechanical Equipment

Specification Section 16150 Motors - Induction for General

Service

1.4 DEFINITIONS

CMTR - Certified Material Test Report

FAT - Factory Acceptance Test

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

- 1.6.1 Certified Material Test Reports (CMTRs) for the metering pumps in accordance with the requirements of this specification section and Data Sheets P33B-DS-1 through DS-3 (Attachment A).
- 1.6.2 Metering pump and motor outline drawing. Dimensions, weights, anchor bolts and base plate details shall be submitted.
- 1.6.3 A list of manufacturer's recommended spare parts for one (1) year's routine operation. Include sufficient data to permit procurement either from the original manufacturer or any subsupplier.
- 1.6.4 Operation and maintenance manuals in accordance with Specification Section 01730. Complete installation manuals shall also be submitted.
- 1.6.5 Design Calculations

A mechanical design analysis shall be submitted. This analysis shall include supporting calculations used to establish connected horsepower, shaft sizes, bearing loads and operating characteristics. Calculations shall be complete and in sufficient detail to permit a second-party review.

- 1.6.6 Seller shall submit Factory Acceptance Test (FAT) procedures in accordance with Paragraph 2.5.1.
- 1.6.7 Seller shall submit certified performance test results prior to shipment in accordance with Paragraph 2.5.
- 1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

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1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

Climatic and Geographic Site Conditions 1.8.1

> 714 feet above sea level Site Elevation Α.

В. Barometric Pressure 14.3 psia

С. Outside Design Temperature

> 110°F (1) Maximum Design Temperature

> (2) Minimum Design Temperature -20°F

(3) Wet Bulb Design Temperature 68°F

1.8.2 Operating Environment

> 60°F to 104°F Α. Normal Temperature

104°F В. Maximum Temperature

С. Relative Humidity Not controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- The controlled-volume metering pump furnished in accordance Α. with this specification section shall be capable of continuous operation throughout the range of the pump's capacity. The pump shall be of the diaphragm type. automatically controlled by an outside electrical signal. The diaphragm shall be actuated by a mechanically-coupled push rod. The diaphragm isolates the push rod from the process fluid. A built-in relief valve shall be included to relieve the pump's full capacity. This relief valve shall be set at 20 percent above the maximum operating discharge pressure. Guided, controlled-travel, double-ball check valves shall be installed on both suction and discharge. Valves shall have renewable seats of either the screwed-in or shouldered type. Oil lubrication shall be performed either by splash or force-feed system. The pump shall be provided with a manual local stroke adjustment. This is in addition to the remote volume adjuster.
- The metering pump shall be furnished with an automatic В. volume control. The volume/capacity control shall be continuously variable from no flow to maximum capacity condition. Repetitive accuracy of all the volume adjustments

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shall be not less than 98 percent between the range of 10 to 100 percent of the specified pump capacity.

2.2 FABRICATION AND MANUFACTURE

2.2.1 Material for the metering pump shall be stainless steel in accordance with ASTM A217/A217M. Castings shall be sound. No shrink, blow holes, scale, blister and other defects shall be permitted. Surfaces shall be cleaned by manufacturer's standard methods. All casting burrs shall be filed or ground flush with the casting surface. The use of plastic or cement compounds to repair leaks and defects in pressure casings shall not be permitted.

Design stress, temperature restrictions and physical properties for the pump material shall be in accordance with the limitations for similar materials in ASME Section VIII, Division I. Pressure-containing parts shall be built in accordance with ASME Section VIII, Division I. Code stamp and data report forms are not required.

- 2.2.2 The electrical motor for the metering pump shall be in accordance with Specification Section 16150.
- 2.2.3 The pump base shall have provisions to accommodate the minimum anchorage requirements shown below. The bolt holes shall be 1/8" larger than the required bolt size.

ITEM	ANCHOR BOLT NO. AND SIZE
PX-540-038A PX-540-038B PX-540-038C PX-540-038D	Three - 5/16" diameter bolts
PX-540-031	Four - 1/2" diameter bolts
PX-540-033	Four - 1/2" diameter bolts

- 2.2.4 Flexible couplings and baseplate are used as required by the pump design and manufacturer's standards.
- 2.2.5 The maximum envelope for the metering pumps and the model number or equal are shown in Attachment B.

2.3 LABELING

Labeling shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6. Such labeling shall be in addition to the manufacturer's identification plate.

The pump shall be provided with a cast in or permanently attached direction of rotation arrow located on the drive end of the pump.

2.4 COATINGS

After completion of all fabrication procedures the external surfaces of each pump shall be thoroughly cleaned of all foreign material, including rust, in accordance with SSPC SP-6.

Manufacturer's standard prime and finish paint or coatings shall be applied. Stainless steel surfaces shall not be painted unless specified otherwise.

2.5 TESTING

- 2.5.1 Seller shall provide test procedures that demonstrate the performance characteristics of the metering pump. Test procedures shall be approved by Buyer before use.
- 2.5.2 Factory Acceptance Tests (FATs)

Factory acceptance tests shall be performed in accordance with HI requirements.

- 2.5.3 Test procedures for hydrostatic testing, production testing and calibration testing with inspection shall be in accordance with HI test standards.
- 2.5.4 Seller shall provide certified results for all tests performed.

2.6 PACKAGING

- 2.6.1 Preparation for shipment and packing shall be in accordance with Seller's standards. At minimum, packaging shall provide protection against corrosion and damage during normal handling, shipping and storage. Minimum preparation shall include the requirements listed below.
- 2.6.2 Machined surfaces, threads, bearings and bearing housings shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- 2.6.3 Flanged openings shall be covered with wood or plastic protectors. Protectors shall be installed with a minimum of four (4) full diameter steel bolts and nuts of compatible material with the flange.
- 2.6.4 Threaded connections and tapped holes shall be capped or plugged to prevent thread damage. Compatible materials shall be used.
- 2.6.5 Pump Unit Assemblies shall be shipped fully assembled on baseplate.

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- 2.6.6 Bracing, supports and rigging connections shall be provided to prevent damage during shipment, loading and unloading.
- 2.6.7 Separate or loose parts shall be completely boxed and attached to the main item to be shipped as a unit. All shipping boxes shall be identified by the Seller's order number, equipment number and equipment description.

PART 3 EXECUTION

(Not Used)

END OF SECTION

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FLUOR	DANIEL							*****		P33B-DS		0
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Richland,	, Washington					•	⇉	****		SPECIFICATION SE	_	
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	APHRAGM				\wedge		_			ORIG BY CHI	SSL	APPR'D
ALL ITEMS SHALL				OICIOATI	ON OUEF	TO: 11				0.00207	<u> </u>	
								62-21 (SS 150	94 <i>9)</i>	F4 15 455 0 40 T		
ServiceDIATO SLURRY	FEED PUMP	,,,,	-	No. Moto	or Driven .					PUMP MATER		
D 145				Pump Ta	a No.	PX-540-03	1		Casing	<u>316L S.S</u>	·	
Pump Mfr.		_				US EARTH		?Y	Impeller			
Size & Type				FEEL	PLIMP				internal P	Parts		
No. Stages								 -				
Social No.				Motor Ta	g No	SAME				os Req1		
Serial No.				Motor Pr	ovided By	MANU	HACIL	<u>HER</u>	No. Turbii	ne Driven		
	LIQUID				OPERA	TING CON) III) (A	15		SITE CONDITI	ONS	
Name DIATOR		H SL	.UR.RY	Capacity	(U.S. GP		<u> </u>		Temp #=): Max		
ļ · · · ·					•	,. Ra	ted	6.88	i ''	•		
						re (PSIG): _			ļ.	id. (%): Max	Min.	
Pumping Tempera		4in			Pressure (Altitude (F	Feet):		
Normal							a d	-0.4	O Inc	foor O Heater	O Roo	of
Specific Gravity: @						re (PSI):			000	rtdoor O Unhea	ted 🔘 Sur	n
Vapor Press. (PSIA						Feet):			Area Clas	sification:3		
Viscosity (CP): @						· ·			Other:			
Corrosion/Erosion	•					eet):3			Hemerks:	-		
Remarks:				Hydrauli	c Power (I	HP): 0. ;			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
								Manufacture	r)	·		
Proposal Curve No	o.:			Minimum	Continue	ous Flow (G	PM):		NPSH Red	quired (Feet Water)	· ——	
Speed (RPM):				Therma	al	Stable	e		3% He	ad Drop		
Efficiency (%):				Max. Hea	d Rated I	lmp. (Feet):			Suction S	pecified Speed:		
Rated Power (BHP									•	•		
	<u> </u>							neer and Man	efectured		· · · · · · · · · · · · · · · · · · ·	
NOZZLES	SIZE			ING	FAC	CING	I C	CATION	MIC	C. CONNECTIONS	CIZE	TVDE
Suction										Orain	3,20	TIPE
Discharge										/ent		1
Casing Mount:	Foot		Bracket	Impell	er Dieme	ter (inches)			<u> </u>	Pressure Gage	 	+
	-		nline		ted			Min	<u> </u>	Varm Up	+	
		_	mine Radial						-		+	
_	_	_		•	er Type:	Oper		Closed		Salance Line		
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Max. Allowable Pre					•	ing End):	∟l cw	⊔ ccw		Туре		
At 60°FT					ig (Type/N	•			_	Size/No. Rings _		
Hydro Test Pressur	,								N	Mechanical Seal:		
			API 614							API Class code _		i
Lubrication Type:	_	_		Coupli	-					Manufacturer		
	-		Oil Mist			r				Model		
Flood E	☐ Flinger	۶ لــا	Pressure		•				_	Mfr. Code		
rwillaiks.						pling Mount	-		_	Cartridge Ty		
	······································		-	O Pul	прит. (Oriver Mf	ı. O	rurchaser	G	iland Type/Mat'l.:		
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DATE	DATA SHEET U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 METERING PUMPS ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFI Service ZEOLITE SLURRY FEED PUMP No. Pump Mfr. Pun Size & Type No. Stages	ICATION SHEETS: H-2-123362-21 (SS Motor Driven 1 mp Tag No. PX-540-033	DATE CONTRACT 04-13-89 845734 TAG NO PX-540-033 SPECIFICATION SECT NO. 15649 FOR CUENT USE ORIG BY CHK'D APPR'D J. Janzen SSL 15649) PUMP MATERIALS Casing 304L S.S.
DATA SHEET U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 METERING PUMPS ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION SHEETS: H-2-123362-21 (SS 15649) Service ZECUTE SLURRY FEED PUMP No. Motor Driven 1 Pump Mfr. Pump Mfr. Pump Tag No. PX-540-033 Pump Manufacturer No. Stages No. Stages No. Stages Motor Tag No. SAME Motor Provided By MANUFACTURER No. Turbine Driven NA. Normal IT. Max. IT. Min. Pumping Temperature ("F): Normal IT. Max. IT. Min. Specific Gravity: @ IT. "F= 1.027 Vapor Press. (PSIA): 0.46 Max. Rated 0.5 Differential Pressure (PSIG): 33.7 NPSH Available (Feet): 75.9 NPSH Available (Feet): 75.9 Differential Pressure (PSIG): Remarks: PEPFORMANCE (To Be Completed By Manufacturer)	DATA SHEET U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 METERING PUMPS ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFI Service ZEOLITE SLURRY FEED PUMP No. Pump Mfr. Pun Size & Type No. Stages	. Motor Driven1 mp Tag No	### TAG NO PK-540-033 SPECIFICATION SECT NO. 15649 FOR CUENT USE ORIG BY CHK'D APPR'D J. Janzan SSL 15649) PUMP MATERIALS Casing 304L S.S.
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Pump Mfr.	Size & Type	······································	
No. Stages	Size & Type	ZEOLITE SLURRY FEED PUMP	Impeller
No. Stages Motor Tag No. SAME No. Pumps Req 1 No. Turbine Driven MA. No. Turbine MA. Self-Condition MA. No. Turbine Driven MA. No. Turbine Driv	No. Stages		
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Serial No	No. Stages		Tritornal / Bits
Motor Provided By MANUFACTURER No. Turbine Driven NA.	Mot	tor Tag NoSAME	No. Pumps Req
Liquid CPERATING CONDITIONS SITE CONDITIONS			
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Pumping Temperature (°F): Normal	TIGHD	OPERATING CONDITIONS	SITE CONDITIONS
Normal 77 Max. 77 Min. Discharge Pressure (PSIG): 34.2 Specific Gravity: @ 77 °F = 1.027 Vapor Press. (PSIA): 0.46 Viscosity (CP): @ 77 °F = 1.106 Corrosion/Erosion Caused By: Differential Pressure (PSI): 33.7 Remarks: Differential Head (Feet): 75.9 NPSH Available (Feet): 32.1 Hydraulic Power (HP): 0.406 PERFORMANCE (To Be Completed By Manufacturer)	Name ZEOLITE SLURRY (5% WT) Car	pacity (U.S. GPM):	Temp. (°F): Max Min
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Corrosion/Erosion Caused By: Differential Head (Feet): T5.9 Area Classification: Other: Other: Hydraulic Power (HP): PERFORMANCE (To Be Completed By Manufacturer)			Outdoor Ounheated Osun
Remarks: Differential Head (Feet): Other: Other: PSH Available (Feet): Other: Remarks: PERFORMANCE (To Be Completed By Manufacturer)			- Area Classification: 3
Remarks: NPSH Available (Feet): Remarks: PERFORMANCE (To Be Completed By Manufacturer)	*	• •	→ }
PERFORMANCE (To Be Completed By Manufacturer)	Remarks: NPS	SH Available (Feet):	-1
	Hyd	drautic Power (HP): 0.406	Remarks:
Proposal Curve No.: Minimum Continuous Flow (GPM): NPSH Required (Feet Water):	PERFO	ORMANCE (To Be Completed By Manufed	turer)
	Proposal Curve No.: Min	nimum Continuous Flow (GPM):	NPSH Required (Feet Water):
	·	• ,	, , ,
Efficiency (%): Max. Head Rated Imp. (Feet): Suction Specified Speed:	Efficiency (%): Max	x. Head Rated Imp. (Feet):	Suction Specified Speed:
Rated Power (BHP): Max. Power Rated Imp. (BHP):	Rated Power (BHP): Max	x. Power Rated Imp. (BHP):	– _
CONSTRUCTION (To Be Completed By Purchaser and Manufacturer)	CONSTRUCTO	ON (To Be Completed By Purchaser and I	vlenufacturer)
NOZZLES SIZE RATING FACING LOCATION MISC. CONNECTIONS SIZE TYPE	NOZZLES SIZE RATING	FACING LOCATION	MISC. CONNECTIONS SIZE TYPE
Suction			<u> </u>
Discharge Vent			
			
	<u> </u>	• • •	
Casing Mount: Foot Bracket Impelier Diameter (Inches)	Centerline 🔲 Near Cntrl. 🔲 Inline		
Casing Mount:	<u> </u>	Impeller Type: Donn Donn	el Balance Line
Casing Mount: Foot Bracket Impelier Diameter (Inches)	Casing Split: Axial Radial I	imbeller (Abe: The Oben The Close	
Casing Mount:	<u> </u>	•	
Casing Mount:	Casing Type: Diffuser Staggered I	Imp. Suction: Single Doub	le Packing:
Casing Mount:	Casing Type: Diffuser Dstaggered I	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Over	le Packing: nung Manufacturer
Casing Mount:	Casing Type: ☐ Diffuser ☐ Staggered ☐ ☐ Single Volute ☐ Double Volute ☐ Max. Allowable Pressure (PSIG):	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Over Rotation (Coupling End): CW CCV	le Packing: nung Manufacturer V Type
Casing Mount:	Casing Type: Diffuser Staggered I Single Volute Double Volute Max. Allowable Pressure (PSIG): At 60°F	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Overf Rotation (Coupling End): CW CCV Bearing (Type/Number):	le Packing: nung Manufacturer Y Type Size/No. Rings
Casing Mount:	Casing Type: Diffuser Staggered I Single Volute Double Volute Max. Allowable Pressure (PSIG): At 60°F At Nom. Pump Temp.	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Overt Rotation (Coupling End): CW CCV Bearing (Type/Number): Radial	Packing:
Casing Mount:	Casing Type: Diffuser Staggered I Single Volute Double Volute Max. Allowable Pressure (PSIG): At 60°F At Nom. Pump Temp. Hydro Test Pressure (PSIG):	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Overi Rotation (Coupling End): CW CCV Bearing (Type/Number): Radial Thrust	Packing:
Casing Mount:	Casing Type: Diffuser Staggered I Single Volute Double Volute II Double Vo	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Overi Rotation (Coupling End): CW CCV Bearing (Type/Number): Radial Thrust	le Packing: nung Manufacturer V Type Size/No. Rings Mechanical Seal: API Class code
Casing Mount:	Casing Type: Diffuser Staggered I Single Volute Double Volute Max. Allowable Pressure (PSIG): At 60°F At Nom. Pump Temp. Hydro Test Pressure (PSIG): Lubrication Type: API 614 Grease Ring Oil Oil Mist	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Overl Rotation (Coupling End): CW CCV Bearing (Type/Number): Radial Thrust Coupling:	Packing:
Casing Mount:	Casing Type: Diffuser Staggered I Single Volute Double Volute Max. Allowable Pressure (PSIG): At 60°F At Nom. Pump Temp. Hydro Test Pressure (PSIG): Lubrication Type: API 614 Grease Ring Oil Oil Mist	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Overl Rotation (Coupling End): CW CCV Bearing (Type/Number): Radial Thrust Coupling: Manufacturer	le Packing: nung Manufacturer V Type Size/No. Rings Mechanical Seal: API Class code Manufacturer Model
Casing Mount:	Casing Type: Diffuser Staggered I Single Volute Double Volute Max. Allowable Pressure (PSIG): At 60°F At Nom. Pump Temp. Hydro Test Pressure (PSIG): Lubrication Type: API 614 Grease Ring Oil Oil Mist Flood Flinger Pressure	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Overl Rotation (Coupling End): CW CCV Bearing (Type/Number): Radial	le Packing: hung Manufacturer V Type Size/No. Rings Mechanical Seal: API Class code Manufacturer Model Mfr. Code
Casing Mount:	Casing Type: Diffuser Staggered II Single Volute Double Volute Max. Allowable Pressure (PSIG): At 60°F At Nom. Pump Temp. Hydro Test Pressure (PSIG): Lubrication Type: API 614 Grease Ring Oil Oil Mist Flood Flinger Pressure Remarks:	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Overl Rotation (Coupling End): CW CCV Bearing (Type/Number): Radial Thrust Coupling: Manufacturer Type/Model Driver Half-Coupling Mounted By:	le Packing: hung Manufacturer Y Type Size/No. Rings Mechanical Seal: API Class code Manufacturer Model Mfr. Code Cartridge Type Required
Casing Mount:	Casing Type: Diffuser Staggered I Single Volute Double Volute II Double Vo	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Overl Rotation (Coupling End): CW CCV Bearing (Type/Number): Radial Thrust Coupling: Manufacturer Type/Model Driver Half-Coupling Mounted By:	le Packing: hung Manufacturer Y Type Size/No. Rings Mechanical Seal: API Class code Manufacturer Model Mfr. Code Cartridge Type Required Gland Type/Mat'l.:
Casing Mount:	Casing Type: Diffuser Staggered II Single Volute Double Volute Max. Allowable Pressure (PSIG): At 60°F At Nom. Pump Temp. Hydro Test Pressure (PSIG): Lubrication Type: API 614 Grease Ring Oil Oil Mist Flood Flinger Pressure Remarks: C	Imp. Suction: Single Doub Imp. Mount: Btwn. Brgs Overl Rotation (Coupling End): CW CCV Bearing (Type/Number): Radial Thrust Coupling: Manufacturer Type/Model Driver Half-Coupling Mounted By: Pump Mfr. Driver Mfr. Purchase	le Packing: hung Manufacturer Type

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	DA	IN SHE	-' <i>/</i> /	ullet		-{			10-21-92		734
U.S. Depa	artment of Ener	gy	<u></u>	1					PA-S	40-038A/	_
Hantord V	Vaste Vitrification Washington	on Plant	Y.	4		+			PX-SPECIFICATION SECT	40-038C/	<u>'D</u>
DOE Con	tract DE-AC06-	86RL108	38 Z	$\sqrt{}$		7			15	549	
			· /			4			FOR CLIENT USE		
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ווט	APHRAGINI II	IPE .	<u> </u>	7		1			D. Francuz S	SL _	
ALL ITEMS SHALL	COMPLY WITH GE	NERAL SPE	ECIFICATION	SHEETS	6: P3 :	3B-15649					
ServiceANTIFO	DAM FEED PUMP		No. Motor D	rken	4		- 1		PUMP MATERIA	LS	
			140. 1910101 2	· · · · · · · · · · · · · · · · · · ·				sing	304L S.S.		
Pump Mfr			Pump Tag N	io. _P	X-540-036	WB .	—I	•		***	
0: 1 7:				P	<u>X-540-030</u>	BC/D	Im	peller			
Size & Type			ANTIFO	W FEED			Int	ernal Part	304L S.S.		
No. Stages					4446				_		
Serial No.			Motor Tag N					. Pumps i	Req		
Sellat No.			Motor Provi	ded By _	MANU	HACTURER	No	. Turbine	Driven		—— I
	LIQUID		7	VOCDATE	NG CONE	VIIVAR			SITE CONDITIO	NC NC	
Name LIQUID IS			Capacity (U			A11/4/10	T	mn ME	Max. 104	Min.	60_
COMPOUND (10%				-		05			(%): Max	_	
Pumping Temperat			Normal . Discharge F			ted <u>0.5</u> 52.3			(%): <u>714</u>		
	Max. <u>104</u> Min.		Suction Pre					⊗ Indoo	· _	○ Roo	ıf
Specific Gravity: @	°F=	1.0	Max	3	Rate	ed <u>1.26</u>		Outdo	oor Ounheate	d () Sun	
Vapor Press. (PSIA): 0.46		Differential I	Pressure	(PSI):	51			cation: 3	· = ·	- 1
•			 Differential	Head (Fe	et):1	18			Cadon.		
	Caused By:		NPSH Avail	•	-				,	·····	
			Hydraulic P				Re	marka:			
Heritaiks.			i riyonaano r	· / / / / / / / / / / / / / / / / / / /	,. <u> </u>						
	<i>-</i>	P	ERFORMANO	Æ (To Be	Comple	ted By Man	ufacturer)				
Proposal Curve No).:		Minimum Co	ontinuous	s Flow (G	PM):	NP	SH Requi	red (Feet Water): .		
Speed (RPM):			Thermal -		Stable	•		3% Head	Drop		
	 							ction Spec	этгөа эрөөа:		
Rated Power (BHP)):	<u> </u>	Max. Power								
		CONSTRU	UCTION (To E	3e Comp	leted By	Purchaser a	and Manufac	ALIFOT)			
NOZZLES	SIZE	RAT	ING	FACIN	NG	LOCATI	ON	MISC.	CONNECTIONS	SIZE	TYPE
Suction	1/2"	MP7	(P)					Dra	in		
Discharge	1/2"	NP1	r (F)					Ven	t		
Casing Mount:	Foot 🔲	Bracket	Impeller	Diameter	(Inches)			Pre	ssure Gage		
		Inline			Max	Min		Wai	m Up		\vdash
		Radial	Impeller 1		Oper		Closed		ance Line		
_ · · _			•	• •					king:		L
	_	Staggered	•		Singl		Double		•		1
☐ Single Volute	L. Double \	/olute	Imp. Mot			. Brgs 🔲 C	_	ı	Manufacturer		
Max. Allowable Pre						□cw □	CCW	•	Гуре		
			_ Bearing		•			;	Size/No. Rings		 :
•	emp								hanical Seal:		
	e (PSIG):		_ Thrus	· ——				. 4	API Class code		——- I
Lubrication Type:	_ 🛮	API 614	Coupling	:				1	Manufacturer		
Grease [Ring Oil	Oil Mist	Manu	facturer_					Model		
Flood	Flinger 🔲	Pressure	Type/	Model				. 1	Mfr. Code		
Remarks:			Driver Ha	lf-Coupli	ng Moun	ted By:			O Cartridge Type	Require	d _
			O Pump	Mfr. O	Driver Mf	r. O Purci	haser	Glai	nd Type/Mat'l.:		
SECP10.FRM 7/30/92									Bland Plate Taps F	lequired t	for:
105\OS\101\204\8457190	01.MIS/WP51-012593		0=	By Purch	aser 🗆	= By Mfr./I	Purchaser	O Quenc	h O Flush O Dr	ain () V	ent
					B - 1564						

ATTACHMENT B EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

		MAXIMUM	ENVELOPE	(inches)
TAG NUMBER	MODEL NUMBER*	LENGTH	WIDTH	HEIGHT
PX-540-031	American Lewa EH 140-85 Simplex	33.5	32	25
PX-540-033	American Lewa EH 140-100 Duplex	33.5	32	25
PX-540-038A	Milton Roy-Centrac 1" Plunger	14	21	25
PX-540-038B	Milton Roy-Centrac 1" Plunger	14	21	25
PX-540-038C	Milton Roy-Centrac 1" Plunger	14	21	25
PX-540-038D	Milton Roy-Centrac 1" Plunger	14	21	25

^{*}Equipment shall be of this model number or equal.

U.S. DEPARTMENT OF ENERGY Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 15820 VACUUM BLOWERS B-595-P-P33B-15820

APPROVED FOR CONSTRUCTION

REVISION	0	WAPA YES	NO	Χ
SSUE DATE	<u>2-2-93</u>	QUALITY LEVEL I	11	\overline{X}
		SAFETY CLASS $1_{}$ $\overline{2_{}}$	3 <u>X</u>	4_

ORIGINATOR:

CHECKER:

CHECKER:

CHECKER:

CHECKER:

DATE

D. A. Buzzelli, tead Disg. Checker Date

APPROVED BY:

R.B. Euckson Lead Discipline Engineer

<u>1-26-93</u> Date Richland, Washington DOE Contract DE-AC06-86RL10838 Advanced Technology Division Fluor Contract 8457

Rev. 0

SECTION 15820 VACUUM BLOWERS

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SECTION 15820 VACUUM BLOWERS

PART 1 GENERAL

1.1 SUMMARY

This specification section covers the technical requirements for the design, materials, fabrication, inspection and testing of vacuum blowers.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AIR MOVEMENT CONTROL ASSOCIATION, INC. (AMCA)

AMCA Publication 210

1985 Laboratory Methods of Testing Fans

for Rating

AMCA Publication 300

1985 (Rev. 87) Reverberant Room Method

for Sound Testing of Fans

AMERICAN GEAR MANUFACTURERS ASSOCIATION (AGMA)

AGMA 2000-A

1988 Gear Classification and Inspection Handbook: Tolerances and Measuring Methods for Unassembled Spur and Helical Gears (Including Metric

Equivalents)

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.5

1986 Pipe Flanges and Flanged Fittings

ANSI B36.19M

1985 Stainless Steel Pipe (Revision of

ANSI B36.16 - 1976)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A216/A216M

1989 Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding for High Temperature Service

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME PTC-9

1970 (Rev. 85) Displacement

Compressors, Vacuum Pumps and Blowers

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1

1990 Structural Welding Code Steel,

12th Edition

ANTI-FRICTION BEARING MANUFACTURERS ASSOCIATION (AFBMA)

AFBMA 9

1990 Load Ratings and Fatigue Life for

Ball Bearings

AFBMA 11

1990 Load Ratings and Fatigue Life for

Roller Bearings

COMPRESSED AIR AND GAS INSTITUTE (CAGI)

CAGI PNEUROP S5.1

1971 Test Code for the Measurement of

Sound from Pneumatic Equipment,

1st Edition

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA Standard

1978 Guards for Rotating Equipment

Instruction 1-12.14

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

Specification Section 15196 Ide

Identification and Tagging Methods

for Mechanical Equipment

Specification Section 16150

Motors - Induction for General

Service

1.4 DEFINITIONS

FAT - Factory Acceptance Test

TEFC - Totally Enclosed Fan Cooled

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 Drawings shall be submitted for Buyer approval.

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- 1.6.1.1 Α. Certified dimensional outline drawings. These drawings shall indicate dimensions, shipping weights, operating weights, clearances to be maintained, size and location of all connections, lifting supports, materials of construction and corrosion allowances. They shall include equipment support data and equipment performance data (this includes performance curves). Drawings which include the base frame shall depict base plate thickness and bolt hole sizes and location for anchor bolts.
 - В. Sectional drawings. These drawings shall show inside arrangement, construction and details for each component.
 - C. Allowable loads on the blower discharge nozzles and suction nozzles shall be furnished.

All drawings shall include a detailed Bill of Materials. This shall list manufacturer, type and rating of all component parts or assemblies.

- 1.6.2 Receiving, storage and handling instructions to include inspection and checkout tests.
- 1.6.3 Manufacturer's Installation Instructions.
- 1.6.4 Technical Data shall be submitted for Buyer approval.
- 1.6.4.1 Design Calculations - Seller shall provide an engineering design analysis with supporting calculations used to establish horsepower requirements, shaft sizes, bearing loads and operating characteristics. These calculations shall be complete and in sufficient detail to permit second-party review.
- Descriptive Literature Descriptive literature shall be provided 1.6.4.2 by Seller. This literature shall include equipment ratings, model numbers, and technical descriptions.
- 1.6.4.3 Data Sheets
 - Α. Seller shall complete Data Sheet P33B-DS-1 (Attachment A) and submit for the furnished equipment.
- 1.6.4.4 Vacuum Blower Performance Curves

Vacuum blower performance curves shall be submitted. These curves shall include blower brake horsepower, efficiency, pressure drop, slip, viscosity and specific gravity corrections.

1.6.4.5 Factory Acceptance Tests (FATs) as defined in Paragraph 2.2.11.

1.6.5

A list of recommended spare parts for one (1) year's routine operation shall be submitted. The spare parts list shall include sufficient data to permit procurement either from original manufacturer or any subsupplier.

1.6.6 Installation, Operation and Maintenance Manuals

> Seller shall submit operation and maintenance manuals. These shall cover the vacuum blowers furnished in accordance with this specification section. These manuals shall fully detail sequences of disassembly, repair, adjustment, reassembly, lubrication and troubleshooting. Troubleshooting sections shall include fault trees to guide both mechanical and electrical diagnostics. The manuals shall include reduced-size 11X17 copies of any assembly drawing, subassembly drawing or parts list needed for routine maintenance and overhaul. This data shall be submitted in accordance with Specification Section 01730. Complete installation manuals shall also be submitted.

1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

Α.	Site	Elevation	714 feet above sea level
В.	Baro	metric Pressure	14.3 psia
С.	Outs	ide Design Temperature	
	1)	Maximum Temperature	110°F
	2)	Minimum Temperature	-20°F
	3)	Wet Bulb Temperature	68°F
0per	ating	g Environment	

1.8.2

Α.	Normal Temperature	60° to 104°F
В.	Maximum Temperature	104°F
c.	Relative Humidity	Not Controlled

PART 2 PRODUCTS

19/10/2025 H6

2.1 MATERIALS AND EQUIPMENT

2.1.1 **General Requirements**

Vacuum blower assemblies shall be furnished by a manufacturer normally engaged in the production of rotary vacuum blowers. Vacuum blowers furnished in accordance with this specification section shall be standard rotary vacuum blowers, skid-mounted, designed and constructed in accordance with the requirements of ASME PTC-9.

All exposed moving parts shall have heavy-duty removable quards provided in accordance with OSHA Standard Instruction 1-12.14.

2.1.2 Vacuum Blower Casing

Vacuum blower casing shall be carbon steel in accordance with ASTM A216/A216M. The casing and discharge nozzles shall be cast in one piece. Casing shall be designed to withstand a hydrostatic pressure of not less than 1.5 times the blower design pressure.

2.1.3 Impeller

Impeller shall be cast steel in accordance with ASTM A216/A216M. The impeller shall be dynamically balanced in accordance with manufacturer's standard practice.

2.1.4 Strainer

The blower intake shall be protected with a slotted intake strainer. The strainer shall be cast steel in accordance with ASTM A216/A216M. It shall have an effective free area sufficient to prevent pressure drop and efficiency degradation. Strainer shall have a free area not less than four times the crosssectional area of the suction casing. The strainer shall be 99 percent efficient on 10 microns particles and larger.

2.1.5 Vacuum Blower Shaft

Vacuum blower shaft shall be carbon steel. Shafts shall be ground and polished. Wearing surfaces at shaft bearings shall be hardened. The shaft's mechanical properties and diameter shall ensure that whip, deflection or vibration shall not be of sufficient magnitude to impose loads greater than design on the specified shaft bearings under normal operating conditions. A means of clearance adjustment between impeller and casing inner surface shall be supplied from the blower exterior.

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2.1.6 Bearings and Lubrication

Ball or roller bearings shall be furnished. These bearings shall have full provision for the imposed mechanical radial and thrust loads. Bearings shall be sealed and grease-lubricated. They shall have an L-10 rating of 100,000 hours service life calculated in accordance both with AFBMA 9 and AFBMA 11.

2.1.7 Flexible Couplings

A carbon steel flexible coupling in accordance with ASTM A216/ A216M shall be utilized to connect the vacuum blower shaft to the motor shaft. It shall not transmit vibration or end thrust. Under normal operating conditions the coupling shall permit misalignment up to 4 degrees, maximum.

Vacuum blower manufacturer shall mount blower and motor half couplings. Couplings shall be rated for not less than 150 percent of motor nameplate horsepower at design rpm. All metal flexible couplings shall be keyed to both shafts.

2.1.8 Reduction Gears

Reduction gears for the vacuum blower shall be manufactured in accordance with AGMA 2000-A.

2.1.9 Silencers

The vacuum blowers supplied in accordance with this specification section shall be equipped with silencers. These silencers shall be in accordance with manufacturer's standards. The jet silencer shall be mounted on the respective vacuum blower. The discharge silencer shall have three support legs. Material used to fabricate silencers shall be carbon steel in accordance with ASTM A216/A216M.

2.1.10 The vacuum blower skid shall have a minimum of six (6) 15/16 inch diameter bolt holes for 3/4 inch diameter bolts. The discharge silencer shall have a minimum of three support legs with one (1) 15/16 inch diameter bolt hole per leg for 3/4 inch diameter bolts.

2.2 FABRICATION AND MANUFACTURE

2.2.1 General Requirements

The vacuum blower operating point shall be within 10 percent of the peak efficiency on the blower performance curve. At design conditions and at maximum horsepower along the blower curve, the horsepower requirements shall not exceed the motor's nominal rating as shown on the nameplate (excluding service factor). All rotating parts of the assembled equipment shall operate throughout Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

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the required range without excessive vibration, as shown in Paragraph 2.2.5, or noise. The noise level shall not exceed 85 dB at 3 feet peripheral around the blower assembly.

2.2.2 Vacuum Blower Casing

The vacuum blower casing shall be designed both for the maximum discharge pressure at discharge temperature and hydrostatic test pressure at ambient temperature as shown on Data Sheet P33B-DS-1 (Attachment A).

2.2.3 Materials

Castings shall be sound. No shrink, blow holes, scale, blisters or other defects shall be permitted. Surfaces shall be cleaned by Seller's standard methods. All casting burrs shall be filed or ground flush with the casting surface. The use of plastic or cement compounds to repair leaks and defects in pressure casings shall not be permitted.

2.2.4 Bearings

Bearings shall be sized to take the thrust loads of 150 percent of rated capacity at maximum speed.

2.2.5 Balance and Vibration

The rotating assembly of shaft and blower wheel shall be both statically and dynamically balanced in accordance with manufacturer's standard practice before assembly into the housing. The fan shall be given a balance test both after assembly and after installation in the field. The magnitude of vibration of the installed fan shall not exceed the displacement shown in the following table. Measurements shall be taken on the top side of each bearing at two points on the equipment housing and the base at 90° apart. The measurement points shall be permanently marked for future use.

REVOLUTIONS PER MINUTE (RPM)	DISPLACEMENT (MILS)	VELOCITY (IN/SEC-PEAK)
900	0.20	0.0098
1,200	0.15	0.0098
1,800	0.10	0.0098
3,600	0.05	0.0098

2.2.5 Motor

Motors shall be induction type. They shall be totally enclosed fan cooled (TEFC), squirrel-cage type. They shall have normal starting and breakdown torque. Motors shall be in accordance with Specification Section 16150.

2.2.7 Coatings

Vacuum blower motor, silencer and exposed parts of the support frame for the vacuum blower shall be primed and painted in accordance with manufacturer's standard. Stainless steel, plastics and elastomers shall not be painted unless specified otherwise.

2.2.8 Flanges

20216

Flanges supplied with the vacuum blower shall be in accordance with ANSI B16.5.

2.2.9 Welding

Welding of the skid-mounted vacuum blower shall be in accordance with AWS D1.1.

2.2.10 **Piping**

All piping that connects vacuum blower components shall be in accordance with ANSI B36.19M.

2.2.11 Factory Acceptance Tests (FATs)

- A. Seller shall shop test the unit to verify blower performance in accordance with ASME PTC-9. A detailed shop testing procedure shall be submitted for Buyer approval before testing begins. Buyer shall be notified in advance of all source testing. Buyer reserves the right to witness all tests (FATs).
- B. Vacuum blower shall be tested at the factory to provide detailed performance data and demonstrate conformance to this specification section, AMCA Publication 210, AMCA Publication 300 and CAGI PNEUROP S5.1. The vacuum blower shall be hydrostatically tested for a period of not less than 30 minutes. The test pressure shall be not less than one and one-half times the head capabilities of the maximum diameter impeller for the casing at shutoff. Vacuum blower casing shall be free of leaks at the test pressure. No visually-detectable leakage shall occur at any joint during the test.

712 15

Seller shall furnish certified shop test curves and FAT reports. These shall show the blower discharge capacity, efficiency and brake horsepower.

2.2.12 Envelope

С.

The maximum available envelope for the vacuum blower equipment and the model number or equal are shown in Attachment B.

2.3 LABELING

Labeling shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6. Such labeling shall be in addition to the manufacturer's identification plate.

An arrow shall indicate the blower's direction of rotation. This arrow shall be integrally-cast or otherwise permanently attached at the vacuum blower's drive end.

2.4 PACKAGING

- 2.4.1 Preparation for shipment and packing shall be in accordance with Seller's standards. At minimum, they shall provide protection against corrosion and damage during normal handling, shipping and storage.
- 2.4.2 Machined surfaces, threads, bearings and bearing housings shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- 2.4.3 Flanged openings shall be covered with wood or plastic protectors. Protectors shall be installed with not less than four (4) full diameter steel bolts and nuts.
- 2.4.4 Threaded connections and tapped holes shall be capped or plugged. Compatible materials shall be used to prevent thread damage.
- 2.4.5 Vacuum blower unit shall be shipped fully assembled.
- 2.4.6 Bracing, supports and rigging connections shall be provided to prevent damage during shipment, lifting and unloading.
- 2.4.7 Separate or loose parts shall be completely boxed. The box shall then be attached to the main item to be shipped as a unit.

All shipping boxes shall be identified by Seller's order number, equipment number and equipment description.

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PART 3 EXECUTION

(Not Used)

END OF SECTION

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Richland, Washington						15820	
DOE Contract DE-AC06-86RL1	0838				FOR CUENT (JSE	
VACUUM BLOWER					ORIG BY	Тснкр	TAPPR'D
		\triangle			M. Patol	KJM	
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RATED OPERA	TING CO	MULTIONS		CON	STRUCTIO	N MATE	PIAIC
NUMBER OF STAGES	TING CC	MUITONS		CON	SIAUCIIC	MAIE	TIALS
STAGE NO	— ·			CASING		cs	;
GAS COMPRESSED	AIR			ROTOR	_	CS	}
CORROSIVE DUE TO				SHAFT MECH SEAL	-	CS	<u> </u>
HUMIDITY (REL)	100%			VANES/PISTO	ON .		
MOL WT AT INLET (DRY)	29			COUPLING			
CD/CV VALUE AT SUCTION				BASEPLATE	-	cs	<u> </u>
INLET TEMP (DEG F)	78				•		
INLET PRESS (PSIA)	4.6	@ SILENCER I	NLET	CON	STRUCTIO	N MATER	RIALS
DISCHARGE TEMP (DEG F)	l .	BY VENDOR			RESSURE (M		
DISCHARGE PRESS (PSIA)	<u>15.0</u>	SILENCER (WILET	MAX BHP RE	Q'D	AT PUM	•
CAPACITY - NORMAL	l —			INLET PRESS			G ABS
LB PER HR (DRY)	3392			SEAL OIL/PU	MPING FLUIL	·	
ACFM AT INLET (DRY)	<u>2520</u> .			INTIMATE PE	RESSURE (MI	HG ARS)	
BAKE HORSEPOWER AT RATED CONDITIONS	ļ — ·	BY VENI		GAS BALLAS	•		_
RATED OPERA	TING CO			BALLAST G		SLINUL	_
, , , , , , , , , , , , , , , , , , , ,	THING CO	MDITIONS			RATE:		
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☑ VIBRATION ISOLATORS FOR ☑ INLET	OUTLET	M BASEPLATE L OTH	ER	0111211 (012	Oii 17		
CLOSED/OPEN) SYSTEM OIL DEMISTER	NO RE	QD IN (SERIES/PA	RALLEL)				
	TYPE _	P (MM HG abs)	_				
☑ INSTRUMENT PANEL							
COOLING WATER PIPING CONNECTION	S- 917F	RATING			.		
l <u> </u>							
LUBE OIL PIPING CONNECTIONS:		PATING				_	
SEAL OIL DRAIN CONNECTIONS:	SIZE _	RATING					
SEAL OIL BACK-FLOW TRAP							
AUTOMATIC MANUAL BYPASS	CONTROL			-			
OIL DEMISTER CONNECTIONS	INLET 1	TYPE AND SIZE PA	TING				
		T TYPE AND SIZE					
REMARKS:	· 						
			<u> </u>				

REMARKS & SKETCHES:

NOTES: (1) THE SYSTEM INCLUDES INLET AND OUTLET SILENCERS.

(2) 150 HP MOTOR.

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ATTACHMENT B EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

			XIMUM ENVELOP AUST SILENCER	
TAG NUMBER	MODEL NUMBER*	LENGTH	WIDTH	HEIGHT
VP-620-001VA	Roots Model 1016DVJ	176.50	54.5	102
VP-620-001VB	Roots Model 1016DVJ	176.50	54.5	102

^{*}Equipment shall be of this model number or equal.

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SECTION 15821 CENTRIFUGAL BLOWERS B-595-P-P33B-15821

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE 2-2-93		WAPA YES NO X QUALITY LEVEL I II X SAFETY CLASS 1 2 3_X 4_
ORIGINATOR: Jacobson 1/26/93 J. J. Ichkhan, Mechanical Engineer	Date D. A. Buzz	elli ead Disc. Checker Date
APPROVED BY:		
R.B. Euckoon C. J. Divona Lead I	Discipline Engineer	1-26-93 Date

U.S. DEPARTMENT OF ENERGY Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

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SECTION 15821 CENTRIFUGAL BLOWERS B-595-P-P33B-15821

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SECTION 15821 CENTRIFUGAL BLOWERS

PART 1 GENERAL

1.1 SUMMARY

This specification section covers the technical requirements for the design, fabrication, inspection and testing of the centrifugal blowers for the cold feed vent system.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AIR CONDITIONING AND REFRIGERATION INSTITUTE (ARI)

ARI 670

1990 Fans and Blowers

AIR MOVING AND CONDITIONING ASSOCIATION, INC. (AMCA)

AMCA Publication 210

1985 Testing

AMCA Publication 300

1985 Sound Power Levels

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.5

1988 Pipe Flanges and Flanged Fittings

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM 480/A480M

1991 (Rev. 91) Standard Specification for General Requirements for Flat-Rolled Stainless and Heat Resisting Steel Plate.

Sheet and Strip

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME PTC 11

1984 (Rev. 90) Fans

ANTIFRICTION BEARING MANUFACTURERS ASSOCIATION (AFBMA)

AFBMA 9

1990 Edition - Load Ratings and Fatigue

Life for Ball Bearings

AFBMA 11

1990 Edition - Load Ratings and Fatigue

Life for Roller Bearings

INSTRUMENT SOCIETY OF AMERICA (ISA)

ISA S20

1981 Specification Forms for Process Measurement and Control Instruments Primary Elements and Control Values

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA Standard

1978 Guards for Rotating Equipment

Instruction 1-12.14

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

Specification Section 05066 Welding Specialty Equipment

Specification Section 15196 Identification and Tagging Methods

for Mechanical Equipment

Specification Section 16150 Motors - Induction for General

Service

1.4 DEFINITIONS

FAT - Factory Acceptance Test

RPM - Revolutions per Minute

TEFC - Totally Enclosed Fan Cooled

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 Drawings

1.6.1.1 A. Certified dimensional drawings shall be submitted for Buyer approval. These drawings shall include dimensions, shipping weights, operating weights and clearances to be maintained. They shall also show design temperatures and pressures, operating temperatures and pressures, size and location of all connections, lifting supports and materials of construction. Drawings which include the base frame shall include

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- base plate thickness at the foundation bolts, location of anchor bolts and size of control panel fasteners.
- Sectional drawings. These drawings shall show inside В. arrangement construction and details for each component.
- C. The allowable loads on both the blower discharge nozzle and suction nozzle shall be furnished.

All drawings shall include a detailed bill of materials. This bill shall list the manufacturer, type and ratings of all component parts, or assemblies.

- 1.6.2 Technical Data
- 1.6.2.1 Design Calculations - Engineering design analysis with supporting calculations used to establish connected horsepower requirements. shaft sizes, bearing loads, nozzle loading and operating characteristics. Calculations shall be complete and in sufficient detail to permit a second-party review.
- 1.6.2.2 Descriptive Literature

Descriptive literature. This shall include equipment ratings, model numbers, operating characteristics and technical descriptions.

- Data Sheets 1.6.2.3
 - Seller shall submit complete data sheets for the furnished Α. equipment. These data sheets shall reflect the design parameters in Data Sheet P33B-DS-1 (Attachment A).
 - Complete instrumentation data sheets, ISA S20 specification В. forms for process measurement and control instruments, primary elements and control valves.
- 1.6.2.4 Centrifugal Fan Performance Curves

Fan performance curves shall be provided for Buyer approval. These curves shall include fan brake horsepower, efficiency and applicable corrective factors.

1.6.2.5 Seller shall submit reports of Factory Acceptance Tests (FATs) as defined in Paragraph 2.4.

1.6.3 Spare Parts List

A list of recommended spare parts for one (1) year's routine operation shall be supplied. The spare parts list shall include sufficient data to permit procurement from the original manufacturer or any subsupplier.

1.6.4 Installation, Operation and Maintenance Manuals

> Seller shall provide operation and maintenance manuals. These shall cover the centrifugal fans furnished in accordance with this specification section. The manuals shall fully detail sequences of disassembly, repair, adjustment, reassembly, lubrication and troubleshooting. Troubleshooting sections shall include fault trees to guide both mechanical and electrical diagnostics. This data shall be submitted in accordance with Specification Section 01730. Complete installation manuals shall also be submitted.

1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

Α.	Site	Elevation	714 feet above sea level					
В.	Baro	metric Pressure	14.3 psia					
С.	Outs:	ide Design Temperature						
	1)	Maximum Design Temperature	110°F					
	2)	Minimum Temperature	-20°F					
	3)	Wet Bulb Design Temperature	68°F					
Đ.	Opera	ating Environment						
	1)	Normal Temperature	60°F to 104°F					
	2)	Maximum Temperature	104°F					
	3)	Relative Humidity	Not controlled					

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General Requirements

Centrifugal blowers shall be furnished by a manufacturer normally engaged in the production of industrial centrifugal fans. Fans furnished in accordance with this specification section shall be centrifugal fans designed and constructed in accordance both with ARI 670 and ASME PTC-11 for the intended service. The fan blower selected shall operate at no more than 5 percent divergence from the maximum efficiency point when operating at design air flow and static pressures as defined on Data Sheet P33B-DS-1 (Attachment A).

2.1.2 Materials

The material for the fabricated fan and support base shall be stainless steel in accordance with ASTM 480/A480M.

2.1.3 Air Flow Control

The air flow control shall be made with variable inlet vanes. The inlet vanes shall be designed to permit capacity variation from full capacity to less than 30 percent flow without deviation from characteristic performance curve. The fan unit shall consist of the inlet vanes, control unit and all necessary linkage and shafts.

2.2 FABRICATION AND MANUFACTURE

2.2.1 The centrifugal blower operating point shall be within 10 percent of the peak efficiency on the blower performance curve. The horsepower requirements shall not exceed the nominal rating of the motor as shown on the nameplate (excluding service factor).

All rotating parts of the assembled equipment shall operate throughout the required range without excessive vibration, in accordance with Paragraph 2.2.2, or noise. The noise level shall not exceed 85 dB at 3 feet peripheral around the blower assembly.

2.2.2 Balance and Vibration

The rotating assembly of shaft and blower wheel shall be both statically and dynamically balanced in accordance with manufacturer's standard practice before assembly into the housing. The fan shall be given a balance test both after assembly and after installation in the field. The magnitude of vibration of the installed fan shall not exceed the displacement shown in the

following table. Measurements shall be taken on the top side of each bearing at two points on the equipment housing and the base at 90° apart. The measurement points shall be permanently marked for future use.

Revolutions Per Minute (RPM)	Displacement (mils)	Velocity (in/sec-peak)
900	0.20	0.0098
1,200	0.15	0.0098
1,800	0.10	0.0098
3.600	0.05	0.0098

2.2.3 Blower Housing

Blowers larger than 40-inch wheel diameter shall have a maximum RPM of 850. Wobble and lobe shall be $\pm 1/8$ inch of wheel dimensions. The fan housing, including inlet box where required, shall be constructed for the cutoff pressure of the blower. Housing shall have round bell-mouth inlet. The housing shall be adequately reinforced to minimize vibration and panel pulsation. Access doors and inlet and outlet connections shall be flanged and drilled for bolting and adequately rigid for gasket compression. All welding shall be continuous and in accordance with Specification Section 05066.

2.2.4 Blower Base

Structural steel base shall be provided for the blower except those with inlet box. Base shall accommodate blower housing, motor, V-belt drive or flexible coupling and outboard bearings. Bearing pedestal and soleplate shall be provided for the blower with inlet box.

2.2.5 Bearings

Bearings on blowers furnished in accordance with this specification section shall be of one of the following types:

- A. Antifriction, self-aligning, double-row spherical roller bearings. These bearings shall have split-pillow block housing.
- B. Ball bearing manufactured in accordance with blower manufacturer's standard.

The bearings shall have accessible connections for lubrication with either oil or grease. The bearing housing shall have either grease or oil seals as appropriate. Bearings shall be designed for not less than 100,000 hours service life in accordance both with AFBMA 9 and AFBMA 11.

Seals 2.2.6

The linkage and shaft combination shall penetrate the inlet box or blower housing with a seal. The member that penetrates the box or housing shall be a cylindrical shaft. Only rotational motion around the centerline of the shaft shall be required at the point of penetration to move the vanes through the maximum operating range. The seal and the affected housing or box shall maintain the leak test requirements of Paragraph 2.4 under both static and dynamic conditions. No additional temporary sealing shall be used at the shaft during tests.

2.2.7 Driver

The driver shall be an electrical motor provided in accordance both with Specification Section 16150 and this specification section.

The electric motor shall be integral, foot mounted, totally enclosed fan cooled (TEFC), squirrel cage induction motor. It shall have normal across the line starting and breakdown torque.

2.2.8 Belt or Coupling Guards

> Guards shall be provided on all exposed moving parts. Guards shall be in accordance with OSHA Standard Instruction 1-12.14.

2.2.9 Welding

> All blower unit assembly welding requirements shall be in accordance with Specification Section 05066.

- 2.2.10 The centrifugal blower base plate shall be anchored with a minimum of four 1/2 inch diameter steel anchor bolts. Bolt holes shall be 11/16 inch diameter.
- 2.2.11 Design Envelope

Maximum size envelope and model number or equal are shown in Attachment B.

2.2.12 Flanges and flanged connections shall be in accordance with ANSI B16.5.

2.3 **LABELING**

Labeling and tagging shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6. This shall be in addition to the manufacturer's identification plate.

An arrow shall indicate centrifugal blower rotating direction. The arrow shall be located on the centrifugal blower drive end. It shall be integrally-cast or otherwise permanently attached.

2.4 INSPECTION AND TESTING

2.4.1 Factory Acceptance Tests (FATs)

Seller shall shop-test the centrifugal blower unit to verify performance in accordance with AMCA Publications 210 and 300 and ASME PTC 11. The tests shall include positive pressure test, negative pressure test and shaft seal leak test. Buyer shall be notified in advance of all source testing and shall be allowed to witness all tests (FATs).

2.5 PACKAGING

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Packaging and preparation for shipment shall be in accordance with Seller's standards. At minimum, protection shall be provided against corrosion and damage during normal handling, shipping and storage. Minimum preparation shall include the requirements listed below.

- 2.5.1 Machined surfaces, threads, bearings and bearing housings shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- 2.5.2 Flanged openings shall be covered with wood or plastic protectors. Protectors shall be installed with not less than four (4) full diameter steel bolts and nuts.
- 2.5.3 Threaded connections and tapped holes shall be capped or plugged. Compatible materials shall be used to prevent thread damage.
- 2.5.4 Centrifugal Blower Unit Assemblies shall be shipped fully assembled on baseplate.
- 2.5.5 Bracing, supports and rigging connections shall be provided to prevent damage during shipment, lifting and unloading.
- 2.5.6 Separate or loose parts shall be boxed. The box shall be attached to the main item to be shipped as a unit.

All shipping containers shall be identified by Seller's order number, equipment number and equipment description.

PART 3 EXECUTION

(Not Used)

END OF SECTION

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ATTACHMENT B EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

TAG NUMBER	MODEL NUMBER*		MAXIMUM LENGTH	1 ENVELOPE (inches) HEIGHT
BL-560-001A	Buffalo Forge Mode	1 RE-4	25	35	35
BL-560-001B	Buffalo Forge Mode	1 RE-4	25	35	35

^{*}Equipment shall be of this model number or equal.

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FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 15894 VIBRATING FILTERS B-595-P-P33B-15894

APPROVED FOR CONSTRUCTION

REVISION ISSUE DATE	2-2-93	WAPA QUALITY LEV		NO II	<u>X</u>
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APPROVED BY:

C. J. Divona Lead Discipline Engineer

1-26-93 Date U.S. DEPARTMENT OF ENERGY Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

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SECTION 15894 VIBRATING FILTERS B-595-P-P33B-15894

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DOE Contract DE-AC06-86RL10838

SECTION 15894 **VIBRATING FILTERS**

PART 1 GENERAL

1.1 SUMMARY

This specification section covers the technical requirements for the design, materials, fabrication, testing and preparation for shipment for vibrating filter units. These units consist of tubular filter elements valved to operate and backwash individually, mounted in parallel on common inlet, outlet. backwash supply and drain headers.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.5

1988 Pipe Flanges and Flanged Fittings

ANSI B36.19M

1985 Stainless Steel Pipe

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) Boiler and Pressure Vessel Code

ASME Section II.

1989 Material Specifications-Ferrous

Part A

Materials

SA-240

Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate,

Sheet, and Strip for Pressure Vessels

SA-790/SA-790M

Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Pipe

ASME Section VIII. Division 1

· 1

1989 Rules for Construction of Pressure

Vessels

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1

1990 Structural Welding Code Steel, 12th

Edition

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INSTRUMENT SOCIETY OF AMERICA (ISA)

ISA S20

1981 Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-6

1989 Surface Preparation Specification No. 6, Commercial Blast Cleaning

1.3 **RELATED REQUIREMENTS**

Specification	Section	01730	Operation and Maintenance Data
Specification	Section	05063	Welding Pressure Vessels
Specification	Section	15196	Identification and Tagging Methods for Mechanical Equipment
Specification	Section	16610	Electrical Requirements for Packaged Mechanical Equipment
Specification	Section	17892	Frit Slurry Filter Local Panels
Specification	Section	17893	Instruments Furnished with Mechanical Equipment Frit Slurry Filter

1.4 **DEFINITIONS**

- Factory Acceptance Test

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 **SUBMITTALS**

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

Documentation which shows that the control panels for the 1.6.1 vibrating filters are in accordance with Specification Section 17892.

1.6.2 Drawings

- 1.6.2.1 A. Certified dimensional outline drawings shall be submitted for Buyer approval. These drawings shall indicate dimensions, shipping weights, operating weights, clearances to be maintained, size and location of all connections, lifting supports, materials of construction and corrosion allowances. They shall include equipment support data and equipment performance data (this includes performance curves). Drawings which include the base frame shall depict base plate thickness at the foundation bolts.
 - B. Sectional drawings. These drawings shall show inside arrangement construction and details for each component.
 - C. Allowable loads on the vibrating filter discharge nozzles and suction nozzles shall be furnished for Buyer approval.

All drawings shall include a detailed Bill of Materials. This shall list manufacturer, type and rating of all component parts or assemblies.

1.6.3 Electrical Diagrams

Electrical diagrams shall be submitted in accordance with Specification Section 16610.

- 1.6.4 Technical Data
- 1.6.4.1 Design Calculations Seller shall provide an engineering design analysis with supporting calculations used to establish performance, bearing loads and operating characteristics. These calculations shall be complete and in sufficient detail to permit second or third-party review.
- 1.6.4.2 Descriptive Literature Descriptive literature shall be provided. This literature shall include equipment ratings, model numbers, operating characteristics and technical descriptions.
- 1.6.4.3 Data Sheets
 - A. Seller shall submit completed data sheets for the furnished equipment. These data sheets shall reflect the design parameters in Data Sheets P33B-DS-1 and DS-2 (Attachment A).
 - B. Complete instrumentation data sheets, ISA S20 specification forms for process measurement and control instruments, primary elements and control valves.

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1.6.4.4 Vibrating Filter Performance Curves

Vibrating filter performance curves shall be submitted for Buyer approval. These curves shall include efficiency, pressure drop, viscosity and specific gravity corrections.

- 1.6.4.5 Factory Acceptance Tests (FATs) as defined in Paragraph 2.2.13.
- 1.6.5 Spare Parts List

A list of recommended spare parts for one (1) year's routine operation shall be submitted. The spare parts list shall include sufficient data to permit procurement either from original manufacturer or any subsupplier.

1.6.6 Installation, Operation and Maintenance Manuals

Seller shall submit operation and maintenance manuals. These shall cover the vibrating filters furnished in accordance with this specification section. These manuals shall fully detail sequences of disassembly, repair, adjustment, reassembly, lubrication and troubleshooting. Troubleshooting sections shall include fault trees to guide both mechanical and electrical diagnostics. The manuals shall include reduced-size copies of any assembly drawing, subassembly drawing or parts list needed for routine maintenance and overhaul. This data shall be submitted in accordance with Specification Section 01730. Complete installation manuals shall be submitted.

1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

- 1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS
- 1.8.1 Climatic and Geographic Site Conditions
 - A. Site Elevation 714 feet above sea level
 - B. Barometric Pressure 14.3 psia
 - C. Outside Design Temperature
 - Maximum Design Temperature 110°F
 - Minimum Design Temperature -20°F
 - Wet Bulb Design Temperature 68°F

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1.8.2 Operating Environment

Α	 Norma 	l Temperature	60° to 104°F

В. Maximum Temperature 104°F

C. Relative Humidity Not controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- 2.1.1 The vibrating filter system shall be a multiple element-type filter. It shall be furnished as a complete, automatic, selfcleaning filter system. The vibrating filter system design shall be in accordance both with ASME Section VIII, Division 1 and ANSI B36.19M for interconnecting piping.
- 2.1.2 The vibrating filter system shall be designed to maintain the design flow during the backwashing cycle. The required number of elements shall be specified by Seller in accordance with P33B-DS-1 and DS-2 (Attachment A).
- 2.1.3 The vibrating filter system logic shall control a backwash flow scheme. Process water shall be used as the backwash source. Backwash duration and required quantity of backwash fluid shall be specified by Seller.
- 2.1.4 Seller shall furnish the vibrating filter with automatic backwashing and a multiple tube-type filtration system. It shall be designed as a complete, self-contained, modular package capable of continuous operation.
- 2.1.5 The vibrating filter system shall be skid-mounted. The maximum envelope dimension and model number or equal are shown in Attachment B.
- The vibrating filter skid shall be anchored with a minimum of four 2.1.6 equally spaced 1/2 inch diameter anchor bolts. Bolt holes shall be 11/16 inch diameter.

2.2 **FABRICATION AND MANUFACTURE**

2.2.1 General Requirements

The vibrating filter system shall be manufactured in such a manner that pressure drop shall be at its minimum over the flow range of the filter system. The noise level shall not exceed 85 dB at 3 feet peripheral around the filter system assembly.

- 2.2.2 The vibrating filter housing shall be Type SA-240 stainless steel in accordance with ASME Section II, Part A.
- 2.2.3 All interconnecting valves shall be of the full port opening type to minimize pressure drop across the system.
- 2.2.4 The vibrating filter housing shall be manufactured in accordance with ASME Section VIII, Division 1.
- 2.2.5 Piping and flanged fittings in the vibrating filter system shall be in accordance both with ANSI B16.5 and ASME Section II, Part A SA-790/SA-790M.
- 2.2.6 Burst strength of the filter element shall be not less than 200 percent of the design pressure in accordance with P33B-DS-1 and DS-2 (Attachment A).
- 2.2.7 Welding on the skid of the skid-mounted vibrating filter shall be in accordance with AWS D1.1. Welding of pressure vessels shall be in accordance with Specification Section 05063. The skid material shall be Type 316L stainless steel.
- The control panel shall be mounted directly on the skid. It shall provide all instruments and controls necessary for safe, reliable and continuous unattended operation of the vibrating system at the specified operating and design conditions of P33B-DS-1 (Attachment A). The control panel shall be in accordance with Specification Section 17892.
- 2.2.9 The vibrating filter system shall be furnished with an automatic sequence programmer. This programmer shall control the sequential backwash of the filter elements. One set of elements shall be backwashed at a time. The programmer shall be supplied with the capability of varying the backwash cycle time. It shall also possess a manual override capability to allow manual filter element backwash. Instruments and control panel shall be in accordance with Specification Section 17892 and 17893.
- 2.2.9.1 The backwash cycle shall be capable of being initiated by both of the following:
 - A. Differential pressure across the filter system.
 - B. Locally-mounted manual switch.

The open and close rates of both the feed and backwash control valves shall be adjustable.

- 2.2.10 Electrical Requirements
- 2.2.10.1 Electrical components shall be in accordance with Specification Section 16610.

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2.2.11 Coatings

After completion of all fabrication procedures the external surfaces of each vibrating filter shall be thoroughly cleaned of all foreign material, including rust, in accordance with SSPC SP-6. Manufacturer's standard prime and finish paint or coatings shall be applied. Stainless steel surfaces shall not be painted unless specified otherwise.

- 2.2.12 Labeling and tagging shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6.
- 2.2.13 Factory Acceptance Tests (FATs)
 - Α. Seller shall shop test the vibrating filter system to verify performance, pressure drops and flow rates. A detailed shop testing procedure shall be submitted for Buyer approval before testing begins.
 - All pressure-containing elements shall be hydrostatically В. tested for a period of time not less than 30 minutes. The test pressure shall be not less than one and one-half times the vibrating filter system's design pressure. During the test no visually-detectable leakage shall occur at any joint.
 - Seller shall furnish certified shop FAT reports prior to С. shipment.
- 2.2.14 Packaging
- 2.2.14.1 Preparation for shipment and packing shall be in accordance with Seller's standards. At minimum, they shall provide protection against corrosion and damage during normal handling, shipping and storage. Minimum preparation shall include the requirements listed below.
- 2.2.14.2 Machined surfaces, threads, bearings and bearing housings shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- Flanged openings shall be covered with wood or plastic protectors. 2.2.14.3 Protectors shall be installed with not less than four (4) full diameter steel bolts and nuts.
- 2.2.14.4 Threaded connections and tapped holes shall be capped or plugged. Compatible materials shall be used to prevent thread damage.
- 2.2.14.5 Vibrating filter unit assemblies shall be shipped fully assembled.

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- 2.2.14.6 Bracing, supports and rigging connections shall be provided to prevent damage during shipment, lifting and unloading.
- 2.2.14.7 Separate or loose parts shall be completely boxed. The box shall then be attached to the main item to be shipped as a unit.

All shipping boxes shall be identified by Seller's order number, equipment number and equipment description.

PART 3 EXECUTION

96/01/2025 146

(Not Used)

END OF SECTION

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VIBRATING - PRESSUR	E FILIEK				K.M. Crabb	RMM	
ALL ITEMS SHALL COMPLY WITH GENERA	I SPECIFICATION :	15894			P&ID NO.:		
	PFSFT FILTER				1 4.0		
HEM NO FE-380-0024 SERVICE	PROFI FILIEN	DDOOESS	DECICAL		 		
		PROCESS			_		·····-
WATER SOURCE LPW	PRESSURE 65		PSIG, TEMP	40-70	F		
FEED QUALITY: SUSPENDED SOLIDS	370,000		PPM,		J.T.U.		
OTHER							
EFFLUENT QUALITY:	MAKE EQUIVALEN	VT TO 15 MESH			J.T.U.		
OTHER							
TOTAL FLOW RATE 70	GPM, ALLOWABLE HEA	AD LOSS		12 - 15	PSI		
		•			3PM/SQ. FT.		
UNIT CAPACITY 45 - 95 (46,200 LB/HR)	GPM, FILTRATION RATE	<u> </u>					
BACKWASH: RATE 250	GPM, QUANTITY			21 (BALLONS PER CYC	SLE	
LENGTH OF RUN BEFORE BACKWASH	BACKFLUSH @ A	√P = 15 psi					
UPSTREAM TREATMENT:							
				·			•
DOWNSTREAM TREATMENT:							
			.				
		MECHANICA	N DESIGN				
		MECHANIC	AL DESIGN	·			
FILTER MEDIA:							
TOP LAYER:	TYPE	QTY	EFFECTIVE SIZE			PANGE	
	UNIFORMITY COEFF		DENSITY		BED DEPTH		
	-						
	UNIFORMITY COEFF		DENSITY		BED DEPTH		
BOTTOM LAYER:	TYPE	QTY	EFFECTIVE SIZE	<u>_</u>		PANGE	
BOTTOW DATEN.	· · · · · · · · · · · · · · · · · · ·	Q, r				TANTOE	
	UNIFORMITY COEFF		DENSITY		BED DEPTH	-	
OTHER REQUIREMENTS:							
PRESSURE VESSEL: NUMBER	SIDE SHALL		FT., DIAMETER	ı	- 1.		
TYPE OF FILTER: VERTICAL HO	PRIZONTAL OTI-	HEA					
NUMBER OF COMPAR							
MATERIAL OF CONSTRUCTION 316L SS					•		
CORROSION ALLOWANCE	DE	SIGN PRESSURE 1	50 PSIG @ 150°F				
TOTAL WALL THICKNESS INCLUDING CORROSION	NALLOWANCE: SIDE SH	HELL ENDS					
ASME CODED WITH STAMP WITHOUT STAM	₽	NON-CC	DED				
MANHOLE SIZE LOCATION		HANDH	OLE SIZE		LOCATION		
TANK SUPPORT: FIXED LEGS SCF	REW-TYPE JACK LEGS						
INLET DISTRIBUTOA:							
				···			
UNDER DRAIN: STRAINERS DOUBLE							
FACE PIPING: SIZE RATING	MATER	RIAL					
CONNECTIONS 2 INCH AND LARGER SHALL BE A	S A FLANGED	OTHER					
VALVING: TYPE MATERIAL OF CONSTRUCTION	DN	TRIM					
OPERATOR BACKWASH & RINSE CONTROL:	 						
				П			
SAMPLE VALVES PRESSU	IRE GAUGES	WATER M	TER SKID MOUNTED				
BACKWASH PUMP & DRIVER							
PAINTING: INTERNAL PRIME EXTERNAL PRIME		FINISH					
OTHER		rinian					
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FLUOR DANIEL DATA SHEET U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 VIBRATING - PRESSURE FILTER ALL STEMS SHALL COMPLY WITH GENERAL SPECIFICATION SERVICE	NO. BY DATE	REVISION	SHEET NO. P33B-DS-1 DATE 10-19-88 TAG NO. FL-580-4 SPECIFICATION SECT NO. 1588 FOR CLIENT USE URIG BY CHK'D K.M. Crabb RMM P&ID NO.:) H
SHIPPING WEIGHT LBS., VOLUME REMARKS:		CU. FT.		
SKETCH: NOTE: Process data based on Model SS-84-203 Ronning	en-Petter Vibrating	g Slurry Filter.		

								
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VIBRATING - PRESSUF	RE FILTER	$I \setminus V$				KM. Crabb		'"'
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ALL ITEMS SHALL COMPLY WITH GENERA	L SPECIFICATION	15894	f			P&ID NO.:		
	DESET FILTER							
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WATER SOURCE LPW	anconing 65		NOOLS.		40.70			
	PRESSURE 65			PSIG, TEMP	40-70	F		
FEED QUALITY: SUSPENDED SOLIDS	34,000			PPM,		J.T.U.		
OTHER								
EFFLUENT QUALITY:	MAKE EQUIVALEN	<u> </u>	60 MESH			J.T.U.		
OTHER	·····							
TOTAL FLOW PATE 85	GPM, ALLOWABLE HEAD) LOSS	3	· · · · · · · · · · · · · · · · · · ·	12 - 15	PSI		
UNIT CAPACITY 45 - 95 (46,200 LB/HR)	GPM, FILTRATION RATE					GPM/SQ. FT.		
BACKWASH: RATE 250	GPM, QUANTITY							
LENGTH OF RUN BEFORE BACKWASH					21	GALLONS PER C	YCLE	
	BACKFLUSH @ △	P = 1	15 рві					·
UPSTREAM TREATMENT:	 							
DOWNSTREAM TREATMENT:						··	***	7,72

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FILTER MEDIA:		10.1	0101110	AL DECIGIT				
·	7000							·
TOP LAYER:	TYPE		QTY	EFFECTIVE SIZE			RANGE	
	UNIFORMITY COEFF			DENSITY		BED DEPTH		
	UNIFORMITY COEFF			DENSITY		SED DEPTH	· · ·	
BOTTOM LAYER:	TYPE		QTY	EFFECTIVE SIZE			RANGE	
	UNIFORMITY COEFF			DENSITY		BED DEPTH		
OTHER REQUIREMENTS:								
	··· <u>·</u>							
						····		
				-				
PRESSURE VESSEL: NUMBER	SIDE SHALL			FT., DIAMETER		FT.		
TYPE OF FILTER: VERTICAL HO	RIZONTAL OTHE	R						
NUMBER OF COMPAF	TMENTS							
MATERIAL OF CONSTRUCTION 316L SS			****					
CORROSION ALLOWANCE				50 PSIG @ 150°F				
TOTAL WALL THICKNESS INCLUDING CORROSION	ALLOWANCE: SIDE SHE	Щ	ENDS					
ASME CODED WITH STAMP WITHOUT STAM	P.L.		NON-CC					
MANHOLE SIZE LOCATION			HANDH	OLE SIZE		LOCATION		
TANK SUPPORT: FIXED LEGS SCR	EW-TYPE JACK LEGS							
INLET DISTRIBUTOR:								
		_						
	DISH GROUT		OTHER					
	MATERIA				-			
CONNECTIONS 2 INCH AND LARGER SHALL BE AS		OTHER						
VALVING: TYPE MATERIAL OF CONSTRUCTIO OPERATOR	N		TRIM					
BACKWASH & PINSE CONTROL:				·		·····		
	E GAUGES T		MA		7			
	RE GAUGES		WATER M	TER SKID MOUNTED				
PAINTING: INTERNAL PRIME			EINIO	· · · · · · · · · · · · · · · · · · ·				
EXTERNAL PRIME			FINISH	 				
OTHER			, 111,011					
						BAETTY S	LASSIFICATION	
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	ATTROTIMENT A			PAGE 2 OF A
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9	DATE		P338-DS-2	
FLUOR DANIEL			DATE	CONTRACT
DATA SHEET			10-19-88	845734
U.S. Department of Energy			TAG NO.	0-003V
Hanford Waste Vitrification Plant			SPECIFICATION SECT	NO.
Richland, Washington			FOR CLIENT USE	15894
DOE Contract DE-AC06-86RL10838			TON COENT USE	
			OHIG BY TCHK	D APPRO
VIBRATING - PRESSURE FILTER			K.M. Crabb RMI	
ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION	15894		PAID NO.:	
ITEM NO SERVICE				
	ages,			
	·			
SHIPPING WEIGHT LBS., VOLUME	CU. FT.			
PEMAPKS:				

				 -
SKETCH:		······································		
NOTE: Process data based on Model SS-84-203 Ronni	nese Dette Vibration Cham. File			
110121 1 10000 data badda dii inoddi 00 07 200 1 0 iiii	igen-i etter vibraarig Siarry i me	n.		
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Fluor Contract 8457

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ATTACHMENT B **EQUIPMENT MAXIMUM ENVELOPE** AND MODEL NUMBER OR EQUAL

		MAXI	MUM ENVI (inches)	
TAG NUMBER	MODEL NUMBER*	LENGTH	WIDTH	HEIGHT
FL-580-002V	Ronningen-Petter Model 203 A-BW-VIB	63	40	70
FL-580-003V	Ronningen-Petter Model 203 A-BW-VIB	63	40	70

^{*}Equipment shall be of this model number or equal.

U.S. DEPARTMENT OF ENERGY
Hanford Waste Vitrification Plant
Richland, Washington
DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 15896 ROUGHING FILTERS/HEPA FILTERS (MECHANICAL) B-595-P-P33B-15896

APPROVED FOR CONSTRUCTION

REVISION ISSUE DATE	<u>Q-2-93</u>		WAPA QUALITY LE SAFETY CLA	YES NO <u>X</u> EVEL I II <u>X</u> ASS 1 2 3_X 4
ORIGINATOR:		CHECK	KER:	
J. J. Ichkhan	Mechanical Engineer	Date D. A.	Buzzelli, Jedd D	Sc. Checker Date
<u>APPROVED</u>	<u>BY</u> :			
<u>R.B.</u> C. J. Di	Erickson vona Lead D	iscipline Enginee	<u> - 26 -</u> Date	93

SECTION 15896 ROUGHING FILTERS/HEPA FILTERS (MECHANICAL) B-595-P-P33B-15896

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PART	1 1 1 1 1 1	GEN .1 .2 .3 .4 .5 .6 .7	REI REI DEI SYS SUI CL/	MMAI FERI LATI FIN: STEI SMI ASS: OJE(RY ENC ED ITI ITI ITA IFI	ES RE(ON: ES(LS CA	QU S CR	IRI IP	EME	NT N	s YS	TEI	YS.			: :	· · · ·		VEN	i	•	•	•						•	•	•	1 1 2 2 2 2 2 3 3
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SECTION 15896 ROUGHING FILTERS/HEPA FILTERS (MECHANICAL)

PART 1 GENERAL

1.1 SUMMARY

This specification section establishes the minimum requirements for design, fabrication and testing of high efficiency particulate air (HEPA) and roughing filters to be used in an environmental protection application.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B1.20.1

1983 (Rev. 1992) Pipe Threads, General

Purpose (Inch)

ANSI B16.5

1988 Pipe Flanges and Flanged Fittings

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

and/or

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ANSI/ASME NQA-1

1989 Quality Assurance Program

Requirements for Nuclear Facilities

ANSI/ASME N509

1989 Nuclear Power Plant Air Cleaning

Units and Components; Interpretations

ANSI/ASME N510

1989 Testing of Nuclear Air Treatment

Systems

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A176

1990 Standard Specification for Stainless and Heat-Resisting Chromium Steel Plate,

Sheet, and Strip

INSTITUTE OF ENVIRONMENTAL SCIENCES (IES)

IES RP-CC-001-83-T

1983 Recommended Tentative Practices for Testing and Certification of HEPA Filters

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P33B-15896-1

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

MILITARY SPECIFICATIONS (MIL)

MIL-F-51068 1988 (Rev. F) Filter, Particulate, (High

Efficiency, Fire Resistant)

1988 (Rev. D) Filter Medium Fire-MIL-F-51079

Resistant, High-Efficiency

NUCLEAR STANDARD

NE F3-43 1984 Quality Assurance Testing of HEPA

Filters and Respirator Canisters

1984 Specifications for HEPA Filters Used NE F3-45T

by DOE Contractors

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-6 1989 Surface Preparation Specification

No. 6, Commercial Blast Cleaning

UNDERWRITERS LABORATORIES INC. (UL)

UL-586 1990 UL Standard for Safety High

Efficiency Particulate Air Filter Units,

7th Edition

1.3 RELATED REQUIREMENTS

> Specification Section 01730 Operation and Maintenance Data

Specification Section 15196 Identification and Tagging Methods

for Mechanical Equipment

1.4 **DEFINITIONS**

> FAT - Factory Acceptance Test

HEPA - High Efficiency Particulate Air

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 **SUBMITTALS**

> Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

- 1.6.1 The following documents shall be submitted for Buyer approval:
- 1.6.1.1 HEPA filter outline drawings, dimensions and weight.

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1.6.1.2	Detail drawings of the HEPA filter housing and its various
	components. The drawings shall also contain weights, anchor bolt
	details and materials used.

1.6.2 Data Sheets

Seller shall submit complete data sheets for the furnished equipment. These data sheets shall reflect the design parameters in Data Sheets P33B-DS-1 through DS-20 (Attachment A).

- A list of manufacturer's recommended spare parts for one (1) 1.6.3 year's routine operation. Include sufficient data to permit procurement either from the original manufacturer or any subsupplier.
- Operation and maintenance manuals in accordance with Specification 1.6.4 Section 01730. Complete installation manuals shall also be submitted.
- Factory Acceptance Tests (FATs) in accordance with Paragraph 2.5. 1.6.5 Procedure and FAT reports shall be submitted for Buyer approval.
- CLASSIFICATION OF SYSTEMS AND COMPONENTS 1.7

(Not Used)

PROJECT OR SITE ENVIRONMENTAL CONDITIONS 1.8

1.8.1 Climatic and Geographic Site Conditions

A. Site Elevation 714 feet above s	sea level
------------------------------------	-----------

- Barometric Pressure 14.3 psia B.
- С. Outside Design Temperature
 - (1) Maximum Design Temperature 110°F
 - Minimum Design Temperature -20°F (2)
 - Wet Bulb Design Temperature 68°F (3)

Operating Environment 1.8.2

Α.	Normal	Temperature	60°F	to	104°F

104°F В. Maximum Temperature

Not controlled Relative Humidity С.

PART 2 PRODUCTS

MATERIALS AND EQUIPMENT 2.1

The following requirements apply to the HEPA filters furnished in accordance with this specification section.

2.1.1 Filter Medium

The material for the HEPA filter medium shall be in accordance both with MIL-F-51079 and ANSI/ASME N509.

2.1.2 **HEPA** Filter Housing

The materials for the HEPA filter housing shall be Type 304L stainless steel in accordance both with ASTM A176 and ANSI/ASME N509.

2.1.3 Adhesives

Adhesives used both to seal the filter pack into the case and glue gaskets to the case shall either be nonflammable or selfextinguishing. Where the dried film is exposed to an open flame, it shall either not burn or not continue to support combustion when the source of ignition is removed.

2.1.4 Gaskets and Fluid Seals

The HEPA filter shall have a filter-to-housing seal using a continuous knife edge on the mounting frame of the filter housing that mounts to a continuous perimeter channel filled with highly viscous nondrying compound.

2.2 **FABRICATION AND MANUFACTURE**

Fabrication and manufacture of the HEPA filter assembly shall be in accordance with ANSI/ASME N509, MIL-F-51068, MIL-F-51079 and UL-586. The Quality Assurance Program shall be in accordance with ANSI/ASME NQA-1 requirements.

- 2.2.1 The HEPA filter housing shall be designed for bag-in/bag-out capability suitable for installation of a single-element HEPA filter. The housing shall allow the operator to change filters without coming into direct contact with the filter element.
- Each housing door shall be equipped with a double ribbed bag-out 2.2.2 port designed for accepting an 8 mil polyvinyl chloride (PVC) bag. Housing shall be designed to prevent ripping or tearing of the bag during operation.

- 2.2.3 Two bags (one for equipment start-up and one spare) shall be provided and shipped with each HEPA filter housing. The bags shall include an integral shock cord and mittens to facilitate changeout.
- 2.2.4 One banding kit shall be supplied with the HEPA filter housing. The kit shall include all tools and straps necessary for a complete bag-out procedure.
- 2.2.5 HEPA filter housing flanges shall be in accordance with ANSI B16.5. Pipe threads shall be in accordance with ANSI B1.20.1.
- 2.2.6 Welding

All welding for the HEPA filter assembly shall be in accordance with ANSI/ASME N509.

- 2.2.7 The base of the HEPA filter housing shall have provisions to be anchored with no less than eight (8) 1/2-inch diameter bolts, equally spaced. Bolt holes shall be 11/16 inch in diameter.
- 2.2.8 Design Envelope. Maximum envelope sizes and model numbers of equipment or equal are shown in Attachment B.
- 2.3 COATINGS

After completion of all fabrication procedures the external surfaces of the HEPA filters shall be thoroughly cleaned of all foreign material, including rust, in accordance with SSPC SP-6. Manufacturer's standard prime and finish paint or coatings shall be applied. Stainless steel surfaces shall not be painted unless specified otherwise.

2.4 LABELING

Labeling shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6. This shall be in addition to the manufacturer's identification plate.

2.5 TESTING

Testing of HEPA filter assembly and FAT reports shall both be in accordance with ANSI/ASME N510, NE F3-45T and IES RP-CC-001-83-T. Testing shall also be in accordance with NE F3-43 Department of Energy (DOE) document.

2.6 PACKAGING

2.6.1 Preparation for shipment and packing shall be in accordance with Seller's standards. At minimum, they shall provide protection against corrosion and damage during normal handling, shipping and

Richland, Washington DOE Contract DE-AC06-86RL10838

> storage. Minimum preparation shall include the requirements listed below.

- 2.6.2 Machined surfaces and threads shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- 2.6.3 Flanged openings shall be covered with wood or plastic protectors. Protectors shall be installed with not less than four (4) full diameter steel bolts and nuts.
- 2.6.4 Threaded connections and tapped holes shall be capped or plugged. Compatible materials shall be used to prevent thread damage.
- 2.6.5 Bracing, supports and rigging connections shall be provided to prevent damage during shipment, lifting and unloading.
- 2.6.6 Separate or loose parts shall be completely boxed. The box shall then be attached to the main item to be shipped as a unit.

All shipping boxes shall be identified by Seller's order number, equipment number and equipment description.

PART 3 EXECUTION

(Not Used)

END OF SECTION

<u> </u>		ATT/	ACHMEN	I A		···		
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	_	\overline{A}				FOR CLIENT USE		
HEPA FILTER	5						HK'D	APPR'D
				<u> </u>		S. Strauburg	KJM	<u> </u>
TITLE	PRO	DCESS COC	LING WATE	R HEPA FILTER				
						PRIZONTAL)	(VERTI	CAL 🔼)
TYPE ELEMENT (THROW - AWAY _	(CLEANABLE							
		PRO	CESS DES					
NAME OF FLUID FILTEREDSAT				& PROCESS WAT CFM (RATED)	ER VAPOR			LB/HR
QUANTITY FLUID FILTERED OPERATING PRESSURE	-0.1							PSIG
OPERATING TEMPERATURE SPECIFIC GRAVITY @ OPER TEMP	77 0.071							°F LB/FT ³
VISCOSITY @ OPER TEMP	0.02							C-
ALLOWABLE PRESSURE DROP NAME OF PARTICLES REMOVED	AP 1.0 Clean, 5. PARTICLES CON	<u>0 Dirty</u> TAMINATED	WIRADIOAC	TVE COMPONEN	75			H²Q
MAXIMUM PARTICLE SIZE	TATROLLO CON			772 001111 011211				MICRON
MINIMUM PARTICLE SIZE	22.27/.05.4.1	#0000M0 4M	0.40000					MICRON MICRON
SIZE OF PARTICLES REMOVED QUANTITY PARTICLES TO BE REMO		ICHONS AN	U LANGEH					_ MICHON

			ANICAL DI					
DESIGN PRESSURE 3/-5				<u>50</u> •F	CORRO	SION ALLOWANCE	E <u>1/1</u>	<u>6'</u>
CODES: ASME (YES 🛛) (NO) D) STAMP	(YES XI)	(NO 🔲)	OTHER				
MATERIALS OF COI	NSTRUCTION		*CON	NECTIONS	NO	SIZE		RATING
FILTER CASE	304L S	s	INLET		1	1-1/2*		150#
FILTER COVER			OUTLET		1	1-1/2		150#
FILTER ELEMENT SUPPORTS			VENT			1		
FILTER CASE SUPPORTS			DRAIN			+		
FILTER CONNECTIONS			INSTRUME	:MTG		+		
			INSTRUME	1413		+		
ELEMENTS			ļ					
GASKETS						1		
]						HALL BE FLANGE		
FILTER COVER TYPE (THRU BOLTE								S)
DAVIT (YES) (NO):	FILTER CASE SUP	PORTS (YE	:s⊠) (N	O 🔲) MINIMU	M HEIGHT .			
SANDBLAST (YES) (NO X): PAINT (PRIMER (YI	ES 🔲) (N	o 🖾)				
	, ,	,	, , ,	,				
		DATA	BY VEND	ORS			·	
MFR				· · · · · · · · · · · · · · · · · · ·		TYPE NO		
NO REQ'D:	NO OPERATING .		:	NO SPARE				
NO ELEMENTS EACH FILTER	: SIZE	·c).D	. x 'STR	: MATERIAL			
TOTAL ELEMENT DIRT HOLDING C	APACITY		CU FT:		SURFAC	E		SQ FT
CLEAN PRESSURE DROP	PSI:	SHIPPING	WEIGHT					
DESCRIBE METHOD OF REMOVING	ELEMENTS:							
IS DIMENSIONAL OUTLINE INCLUD	ED MES 1	NO D1	IS FILTER IN	ACCORD WITH	SPECS MF	s D) (NO D)		·····
NOTES: (1) FILTERS BID SHALL IN						SAFETY CLASS		10N <u>3</u>
NORMALLY AIR SATURATED WITH V						7		

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HEPA FILTER	s						····	
		\triangle -				S. Straumburg	HKD KJM	APPR'D
TITLE	ME	TER COO	OLING WATER	HEPA FILTER				
NO UNITS REQ'D 2	NO UNITS OF	PERATING	<u>1</u>	SPARE	TYPE (HO	RIZONTAL)	(VERTIC	CAL X
TYPE ELEMENT (THROW - AWAY _	X) (CLEANABLE) 0	THER				
				IGN				
NAME OF FLUID FILTERED SAT QUANTITY FLUID FILTERED	URATED AIR	-	AIR 25	& MELTER COO CFM (RATED)	LING WATER V	MPOR		
OPERATING PRESSURE	-0.1		307	CHW (PATED)				LB/HŘ PSIG
OPERATING TEMPERATURE SPECIFIC GRAVITY @ OPER TEMP	0.071		<u> </u>	· .				
SPECIFIC GRAVITY @ OPER TEMP VISCOSITY @ OPER TEMP ALLOWABLE PRESSURE DROP	0.02 AP 1.0 Class 5.0	Diete						C_
NAME OF PARTICLES REMOVED .	PARTICLES CONT/	MINATEL	WIRADIOACT	ME PARTICLES				— •н <u>²</u> б
MAXIMUM PARTICLE SIZE MINIMUM PARTICLE SIZE								MICRON
SIZE OF PARTICLES REMOVED	99.97% OF 0.3 MK	CRONS A	ND LARGER					MICRON
QUANTITY PARTICLES TO BE REMO	JAED	· · ·						#/HR
		MECH	IANICAL DE	SIGN	<u> </u>			
DESIGN PRESSURE 31-5				<u>;0 </u>		SION ALLOWANCE	Non	0
CODES: ASME (YES X) (NO	□ LL) STAMP	(YES IX)) (NO 🗆)	OTHER _	· · · · · · · · · · · · · · · · · · ·			·
MATERIALS OF COI	NSTRUCTION		*CON	ECTIONS	NO	SIZE		RATING
FILTER CASE	304L SS	•••••	INLET		1	1-1/2"		150#
FILTER COVER			OUTLET		1	1-1/2"		150#
FILTER ELEMENT SUPPORTS			VENT					
FILTER CASE SUPPORTS			DRAIN				1	
FILTER CONNECTIONS			INSTRUMEN	тѕ	· · · · · ·			
ELEMENTS			1					
GASKETS]			<u>.</u>		
			ALL CONN	ECTIONS 2° AN	D LARGER SH	ALL BE FLANGED		
FILTER COVER TYPE (THRU BOLTE)	D-ON (X), SWING B	OLTED-O	N (), CLAMP	ON (_), SCREV	VED (), SPE	CIAL (), - SEE !	, NOTES)
DAVIT (YES) (NO 🔀): _ [FILTER CASE SUPPO	ORTS (Y	ES 🖾) (NC	D) MINIMU	M HEIGHT			
SANDBLAST (YES) (NO 🛛): PAINT PR	IMER (Y	ES 🔲) (NO	· 🗹) 🔙	·			
· · · · · · · · · · · · · · · · · · ·		DATA	BY VENDO	RS				
MFR					<u> </u>	TYPE NO		
NO REQ'D:								
NO ELEMENTS EACH FILTER	: SIZE		D.D;	'*STR:	MATERIAL _			
TOTAL ELEMENT DIRT HOLDING CA	PACITY		CU FT: _		SURFACE			SQ FT
CLEAN PRESSURE DROP		HIPPING	WEIGHT	<u> </u>				
DESCRIBE METHOD OF REMOVING								
IS DIMENSIONAL OUTLINE INCLUDE	D MES 1 INC) 🔲)	IS FILTER IN	CCORD WITH S	PECS MES	□) (NO □)		
NOTES: (1) FILTERS BID SHALL IN	CLUDE INITIAL SET (OF FILTER	NG ELEMENT	S. (2) VAPOR IS	_	SAFETY CLASS	FICATI	ON 3_
NORMALLY AIR SATURATED WITH W	ATER VAPOR. (3) FL	OW THRU	FILTER IS FRO	OM BOTTOM UP.				İ

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HEPA FILTER	S				ORIG BY	HK'D TAPPR'D
					M.W. Bergeron	SSL
TITLE	RO	OR DRAIN CATCH	TANK HEPA FILTER			
NO UNITS REQ'D 1	· · · · · · · · · · · · · · · · · · ·			TYPE (UC	5/704/741	
TYPE ELEMENT (THROW - AWAY _				IYPE (HU Nuclear gr /		VEHTICAL)
TIPE ELEMENT (TITION - AVAIL 2	A.) (CLEANABLE			NUCLEAN GIV	<u>VE</u>	
NAME OF FLUID FILTERED	AID /D/OCCIDI E LII	PROCESS	DESIGN			···
		23.0	19.8	17		
OPERATING PRESSURE			1	41		#/HR
OPERATING TEMPERATURE		77	220	IL NOTE	2	PSIG *F
DENSITY @ OPER TEMP			.055		_	LB / FT ³
VISCOSITY @ OPER TEMP			.021	. []		C _p
ALLOWABLE DIRTY PRESSURE DR			5.0]]		'H₂0
NAME OF PARTICLES REMOVED _			CTIVE			2-
MAXIMUM PARTICLE SIZE						MICRONS
MINIMUM PARTICLE SIZE						_ MICRONS
SIZE OF PARTICLES TO BE REMOV			IONS PARTICLES			_ MICRONS
QUANTITY OF PARTICLES TO BE R	EMOVED					#/HR
		MECHANICA	L DESIGN		77.6	
DESIGN PRESSURE	_ PSIG DESI	GN TEMPERATU	RE	°F CORROS	SION ALLOWANCE	1/16
CODES: ASME (YES) (NO			OTHER			
MATERIALS OF CO	NOTOL WITHOU		CONNECTIONS	1 10	1 000	
FILTER CASE				NO 1	SIZE	RATING
FILTER COVER	304L S.S.	INLET		1	3"	150#
FILTER ELEMENT SUPPORTS	304L S.S.	OUTL		1	3"	150#
	304L S.S.	VENT			<u> </u>	
FILTER CASE SUPPORTS	<u> </u>	DRAIN	-		<u> </u>	
FILTER CONNECTIONS	304L S.S.		RUMENTS			
ELEMENTS	NUCLEAR GRA					
GASKETS	HNO ₃ RESISTA	WT				
,		*ALL	CONNECTIONS 2º A	ND LARGER SE	ALL RE FLANGED	
FILTED COVED TVDE TUDI I DOLTER	CALL A CHANG DO				-	
FILTER COVER TYPE THRU BOLTED	FON (), SWING BO	LTED-ON (X), C	LAMP-ON (), SCRE	WED (), SPEC	CIAL (), - SEE N	OTES)
DAVIT (YES) (NO 🗷):				AUM HEIGHT _		
SANDBLAST (YES) (NO X)	PAINT PI	RIMER (YES				
		DATA BY V	NDORS			··· <u> </u>
MFR	***				TYPE NO	
NO REQ'D:						
NO ELEMENTS EACH FILTER	_		x*STI			
TOTAL ELEMENT DIAT HOLDING CA				SURFACE		SQ FT
CLEAN PRESSURE DROP		HIPPING WEIGHT				
DESCRIBE METHOD OF REMOVING						
IS DIMENSIONAL OUTLINE INCLUDE			ER IN ACCORD WITH	1 SPECS (YES	□) (NO □)	
NOTES: (1) FILTERS BID SHALL INC	CLUDE INITIAL SET C	F FILTERING ELE	MENTS. (2) INLET I	JNE TO HEPA F	ILTER IS HEATED	TO PREVENT
CONDENSATE COLLECTION. TEMPFLOW/LOW TEMPERATURE AND LO	PERATURE AT GAS E	NTERING HEPA I	S INFLUENCED BY F	LOW THROUGH	H HEATED ZONE.	MAXIMUM
	W.FLOW/MAXIMLIM.	TEMPEDATI DE C	MACES CONSIDERED	X.		
-	W FLOW/MAXIMUM	TEMPERATURE (ASES CONSIDEREL).	-	
105\OS\101\204\84571889.001/WP51-01/2	W FLOW/MAXIMUM	TEMPERATURE (ASES CONSIDERED).	SAFETY CLASSII	FICATION 3

		HACHMEN								
FLUOR DANIEL	NO. -	BY DATE	- FRE∖	ASION	SHEET NO.	REV.				
3					P33B-DS-4	CONTRACT				
DATA SHEET	X				03-02-90	845734				
U.S. Department of Energy	KY	_	 		TAG NO.					
U.S. Department of Energy Hanford Waste Vitrification Plant	KA.				FH-520 SPECIFICATION SECT. I					
Richland, Washington DOE Contract DE-AC06-86RL10838	3 D		1		158	96				
					FOR CLIENT USE	-				
HEPA FILTERS			 		ORIG BY CH	-				
	MOUNTED C	DAM CATOU T	WK HEPA FILTE							
111145										
NO UNITS REQ'D NO UN				•	RIZONTAL) (V	ERTICAL X)				
TYPE ELEMENT (THROW - AWAY X) (CLEANAE				NUCLEAR GRA	<u> </u>					
	P	ROCESS DES	IGN							
NAME OF FLUID FILTEREDAR	211.5		13.2	ı) -	· · · · · · · · · · · · · · · · · · ·	# (115				
QUANTITY FLUID FILTERED	<u> </u>	——————————————————————————————————————	1			# / HR				
OPERATING PRESSURE				NOTE	2	PSIG °F				
DENSITY @ OPER TEMP			.055		_	LB / FT ³				
VISCOSITY @ OPER TEMP			.021			C _P				
ALLOWABLE PRESSURE DROP AP			5.0	 ′		•H₂0				
NAME OF PARTICLES REMOVED		Y RADIOACTIVE								
MAXIMUM PARTICLE SIZE						MICRONS				
MINIMUM PARTICLE SIZE						MICRONS				
SIZE OF PARTICLES TO BE REMOVED	99.97%	OF .3 MICRONS	<u>PARTICLES</u>			MICRONS				
QUANTITY OF PARTICLES TO BE REMOVED						. #/HR				
	ME	CHANICAL D	SIGN							
25/21/22/25 25/4										
DESIGN PRESSURE 251.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16°										
	_	MPERATURE _ I) (NO 🔀		F CORROS						
CODES: ASME (YES) (NO 🗵) STA	AMP (YES []) (NO 🗵) OTHER		NUCLEAR GR	NOE				
CODES: ASME (YES 1) (NO 1) STA	AMP (YES [(NO X		NO	NUCLEAR GR	RATING				
CODES: ASME (YES) (NO) STA	AMP (YES [(NO XI) OTHER	NO 1	NUCLEAR GR	RATING 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER STA	AMP (YES [4LSS 4LSS	(NO XI CON INLET OUTLET) OTHER	NO	NUCLEAR GR	RATING				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS (NO X) STA	AMP (YES [(NO XI CON INLET OUTLET VENT) OTHER	NO 1	NUCLEAR GR	RATING 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS	AMP (YES [4LSS 4LSS	(NO XI COP INLET OUTLET VENT DRAIN	OTHER .	NO 1	NUCLEAR GR	RATING 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS	AMP (YES [4LSS 4LSS	(NO XI CON INLET OUTLET VENT	OTHER .	NO 1	NUCLEAR GR	RATING 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS 300	AMP (YES [4L SS 4L SS 4L SS	(NO XI COP INLET OUTLET VENT DRAIN	OTHER .	NO 1	NUCLEAR GR	RATING 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS 300	AMP (YES [4L SS 4L SS 4L SS	(NO XI COP INLET OUTLET VENT DRAIN	OTHER .	NO 1	NUCLEAR GR	RATING 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS NUCLEAR STATEMENT STRUCTION STATEMENT SUPPORTS FILTER CONNECTIONS SOCIETY NUCLEAR NUCLE	AMP (YES [4L SS 4L SS 4L SS	OUTLET VENT DRAIN INSTRUMI	OTHER .	NO T	NUCLEAR GR.	RATING 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS MUCLEA MATERIALS OF CONSTRUCTION 30 MUCLEA M	AMP (YES [41. SS 41. SS 41. SS 41. SS AR GRADE	ON (NO X) INLET OUTLET VENT DRAIN INSTRUMI	OTHER INECTIONS ENTS NECTIONS 2" A	NO 1 1 1	SIZE 3° 3° ALL BE FLANGED	RATING 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CONNECTIONS FILTER CONNECTIONS FILTER CONNECTIONS FILTER CONNECTIONS FILTER CONNECTIONS FILTER COVER TYPE (THRU BOLTED-ON (_), SW	AMP (YES [4L SS 4L SS 4L SS AR GRADE	ON (), CLAM	OTHER INECTIONS ENTS NECTIONS 2" A PON (_), SCRE	NO 1 1 NO LARGER SH	SIZE 3* 3* ALL BE FLANGED CIAL (_), - SEE NO	PATING 150# 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES []) (NO [X]): FILTER CASE	AMP (YES [4L SS 4L SS 4L SS AR GRADE VING BOLTED-	ON (), CLAM	OTHER . INECTIONS ENTS NECTIONS 2" A PON (), SCRE	NO 1 1 NO LARGER SH	SIZE 3° 3° ALL BE FLANGED	PATING 150# 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES []) (NO [X]): FILTER CASE	AMP (YES [44 SS 44 SS 44 SS 44 SS AR GRADE VING BOLTED SUPPORTS AINT PRIMER	ON (), CLAM	OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO) MININ NO	NO 1 1 NO LARGER SH	SIZE 3* 3* ALL BE FLANGED CIAL (_), - SEE NO	PATING 150# 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES (_) (NO (_)): FILTER CASE SANDBLAST (YES (_) (NO (_)): P/	AMP (YES [44 SS 44 SS 44 SS 44 SS AR GRADE VING BOLTED SUPPORTS AINT PRIMER	ON (), CLAM	OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO) MININ NO	NO 1 1 NO LARGER SH	SIZE 3* 3* ALL BE FLANGED CIAL (_), - SEE NO	PATING 150# 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES (_) (NO (_)): FILTER CASE SANDBLAST (YES (_) (NO (_)): P/	AMP (YES [41. SS 41. SS 41. SS 41. SS AR GRADE VING BOLTED- E SUPPORTS AINT PRIMER	ON (), CLAM (YES ()) () (NO (X) *CON ONLET VENT DRAIN INSTRUMI *ALL CON (YES (X)) (I (YES	OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO () MININ NO (X) ORS	NO 1 1 NO LARGER SH	SIZE 3* 3* ALL BE FLANGED CIAL (_), - SEE NO	PATING 150# 150#				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES (_) (NO (_)): FILTER CASE SANDBLAST (YES (_) (NO (_)): P/	AMP (YES [41 SS 41 SS 41 SS 41 SS AR GRADE VING BOLTED- E SUPPORTS AINT PRIMER DA	ON (), CLAM (YES) (I OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO [_]) MININ NO [X]) ORS	NO 1 1 1 ND LARGER SHEWED (_), SPEC	SIZE 3° 3° ALL BE FLANGED CIAL (_), - SEE NO	PATING 150# 150#					
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES _) (NO _X): FILTER CASE SANDBLAST (YES _) (NO _X): PARTIES MFR NO REG'D: NO OPERATIES NO ELEMENTS EACH FILTER: SE	AMP (YES [44 SS 44 SS 44 SS 44 SS 44 SS AR GRADE VING BOLTED E SUPPORTS AINT PRIMER D/	*ALL CON (YES) (I	OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO () MININ NO ()) ORS NO SPARE*ST.	NO 1 1 1 ND LARGER SHEWED (_), SPEC	SIZE 3° 3° ALL BE FLANGED CIAL (_), - SEE NO	PATING 150# 150# DTES)				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CONNECTIONS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES) (NO): FILTER CASE SANDBLAST (YES) (NO): P/ MFR NO REQ'D NO OPERATION NO ELEMENTS EACH FILTER : STOTAL ELEMENT DIRT HOLDING CAPACITY	AMP (YES [4L SS 4L SS 4L SS 4L SS AR GRADE VING BOLTED E SUPPORTS AINT PRIMER DA NG	ON (), CLAM (YES ()) ((TA BY VEND "O.D. (NO (X))	OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO	NO 1 1 1 ND LARGER SHEWED (_), SPEC	SIZE 3° 3° ALL BE FLANGED CIAL (_), - SEE NO	PATING 150# 150# DTES)				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS FILTER COVER TYPE (THRU BOLTED-ON (), SW DAVIT (YES () (NO ()): FILTER CASE SANDBLAST (YES () (NO ()): P/	AMP (YES [44 SS 44 SS 44 SS 44 SS 44 SS AR GPADE VING BOLTED E SUPPORTS AINT PRIMER DA NG SIZE SIZE SHIPPIN	*ALL CON (YES) (I	OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO	NO 1 1 1 ND LARGER SHEWED (_), SPEC	SIZE 3° 3° ALL BE FLANGED CIAL (_), - SEE NO	PATING 150# 150# DTES)				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CONNECTIONS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES (_) (NO (_)): FILTER CASE SANDBLAST (YES (_) (NO (_)): P/ MFR NO REQ'D: NO OPERATIN NO ELEMENTS EACH FILTER: S TOTAL ELEMENT DIRT HOLDING CAPACITY CLEAN PRESSURE DROP PS DESCRIBE METHOD OF REMOVING ELEMENTS:	AMP (YES [44 SS 44 SS 44 SS 44 SS 44 SS AR GRADE VING BOLTED E SUPPORTS AINT PRIMER DA NG SIZE SHIPPIN	ON (NO X) INLET OUTLET VENT DRAIN INSTRUMI *ALL CON ON (), CLAM (YES X) (I (YES X) (I (YES X)) (I (YES X) (I (YES X)) (I (YES X) (I (YES X)) (I (YES X)) (I (YES X) (I (YES X)) (I (YES	OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO () MININ NO ()) ORS NO SPARE*ST	NO 1 1 1 NO LARGER SHEWED (_), SPECHUM HEIGHT R: MATERIAL SURFACE	SIZE 3* 3* ALL BE FLANGED CIAL (_), - SEE NO	PATING 150# 150# DTES)				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CONNECTIONS FILTER CONNECTIONS FILTER CONNECTIONS FILTER CONNECTIONS FILTER CONNECTIONS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES (_) (NO (_)): FILTER CASE SANDBLAST (YES (_) (NO (_)): P/ MFR NO REC'D	AMP (YES [44 SS 44 SS 44 SS 44 SS 44 SS AR GRADE VING BOLTED E SUPPORTS AINT PRIMER D/ NG SIZE SIZE (NO □)	ON (NO X) INLET OUTLET VENT DRAIN INSTRUMI *ALL CON ON (), CLAM (YES X) (I (YES X)) (I TA BY VEND *O.D. CU FT: IG WEIGHT	OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO []) MININ NO [X]) ORS NO SPARE*ST	NO 1 1 1 1 NO 1 1 1 R: MATERIAL _ SURFACE	SIZE 3* 3* ALL BE FLANGED CIAL (_), - SEE NO TYPE NO	RATING 150# 150# DTES) SQ FT				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES (_) (NO (_)): FILTER CASE SANDBLAST (YES (_) (NO (_)): P/ MFR NO REQ'D: NO OPERATIN NO ELEMENTS EACH FILTER: S TOTAL ELEMENT DIRT HOLDING CAPACITY CLEAN PRESSURE DROP PS DESCRIBE METHOD OF REMOVING ELEMENTS: IS DIMENSIONAL OUTLINE INCLUDED (YES (_) NOTES: (1) FILTERS BID SHALL INCLUDE INITIAL	AMP (YES [41. SS 41. SS 41. SS 41. SS 41. SS AR GRADE VING BOLTED E SUPPORTS AINT PRIMER DA SIZE	ON (NO X) INLET OUTLET VENT DRAIN INSTRUMI *ALL CON ON (), CLAM (YES ()) ((YES ()) ((TA BY VEND "O.D. CU FT: IG WEIGHT IS FILTER IN ERING ELEMEN	OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO () MININ NO () MININ ORS NO SPARE*ST.	NO 1 1 1 ND LARGER SHEWED (_), SPECIAUM HEIGHT _ SURFACE LINE TO HEPA F	MUCLEAR GR. SIZE 3* 3* ALL BE FLANGED CIAL (_), - SEE NO TYPE NO	PATING 150# 150# 150# DTES) SQ FT				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES (_) (NO (_)): FILTER CASE SANDBLAST (YES (_) (NO (_)): P/ MFR NO REC'D	AMP (YES [41. SS 41. SS 41. SS 41. SS 41. SS AR GRADE VING BOLTED E SUPPORTS AINT PRIMER DA SIZE SIZE SIZE SIZE GI: SHIPPIN GAS ENTERI	*ALL CON TABY VEND OUTLET VENT DRAIN INSTRUMI *ALL CON (YES () (I (YES ()) (I TA BY VEND "O.D. CU FT: IG WEIGHT IS FILTER IN ERING ELEMEN NG HEPA IS IN	OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO () MININ NO ()) ORS NO SPARE*ST. ACCORD WITH ITS. (2) INLET I FLUENCED BY I	NO 1 1 1 1 NO LARGER SHEWED (), SPECHUM HEIGHT R: MATERIALSURFACE LINE TO HEPA FELOW THROUGH	MUCLEAR GR. SIZE 3* 3* ALL BE FLANGED CIAL (_), - SEE NO TYPE NO	PATING 150# 150# 150# DTES) SQ FT				
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SW DAVIT (YES (_) (NO (_)): FILTER CASE SANDBLAST (YES (_) (NO (_)): P/ MFR NO REQ'D: NO OPERATIN NO ELEMENTS EACH FILTER: S TOTAL ELEMENT DIRT HOLDING CAPACITY CLEAN PRESSURE DROP PS DESCRIBE METHOD OF REMOVING ELEMENTS: IS DIMENSIONAL OUTLINE INCLUDED (YES (_) NOTES: (1) FILTERS BID SHALL INCLUDE INITIAL	AMP (YES [41. SS 41. SS 41. SS 41. SS 41. SS AR GRADE VING BOLTED E SUPPORTS AINT PRIMER DA SIZE SIZE SIZE SIZE GI: SHIPPIN GAS ENTERI	*ALL CON TABY VEND OUTLET VENT DRAIN INSTRUMI *ALL CON (YES () (I (YES ()) (I TA BY VEND "O.D. CU FT: IG WEIGHT IS FILTER IN ERING ELEMEN NG HEPA IS IN	OTHER INECTIONS ENTS NECTIONS 2" A PON (), SCRE NO () MININ NO ()) ORS NO SPARE*ST. ACCORD WITH ITS. (2) INLET I FLUENCED BY I	NO 1 1 1 1 NO LARGER SHEWED (), SPECHUM HEIGHT R: MATERIALSURFACE LINE TO HEPA FELOW THROUGH	MUCLEAR GR. SIZE 3* 3* ALL BE FLANGED CIAL (_), - SEE NO TYPE NO	PATING 150# 150# DTES) SQ FT TO PREVENT MAXIMUM				

		A! IACHMEN	[] A					
FLUOR DANIEL	NO.	BY	REV	ISION	SHEET NO.	REV.		
3 FLOOR DAMEL	 		+		P33B-DS-			
DATA CHEET	. <u>Y</u>		1		DATE	CONTRACT		
DATA SHEET			-		12-19-89 TAG NO.	845734		
U.S. Department of Energy Hanford Waste Vitrification	gy_,					20-003		
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Richland, Washington DOE Contract DE-AC06-	86BI 10838	J———	┥			896		
					FOR CLIENT USE			
HEPA FILTERS	; <u>K</u>	<u> </u>	\ 		ORIG BY C	HK'D APPR'D		
		\ <u></u>	- <u></u>		M.W. Bergeron	SSL		
	ORGANIC AC	D DRAIN CATCH	TANK HEPA FILT	FR				
TITLE				-				
NO UNITS REQ'D				•	RIZONTAL) (VERTICAL		
TYPE ELEMENT (THROW - AWAY X	.) (CLEANABLE		OTHER	NUCLEAR GRA	VDE			
	4. 4. 4. 4.	PROCESS DES	SIGN					
NAME OF FLUID FILTERED								
	211.5		19.8	1		# / HR		
OPERATING PRESSURE			- 02		=:	PSIG		
OPERATING TEMPERATURE			220	NOTE	2	°F		
DENSITY @ OPER TEMP	0.0	70	0.055	lſ		LB / FT ³		
VISCOSITY @ OPER TEMP		18	0.021			C _P		
ALLOWABLE PRESSURE DROP AP			5.0)		'H ₂ 0		
NAME OF PARTICLES REMOVED		CLES CONTAMINA	NTED WITH RADA	OACTIVE COME	PONENTS			
MAXIMUM PARTICLE SIZE						MICRONS		
MINIMUM PARTICLE SIZE						_ MICRONS		
SIZE OF PARTICLES TO BE REMOVE		OF 3 MICRONS	AND LARGER			_ MICRONS		
QUANTITY OF PARTICLES TO BE RE						_ #/HR		
		CHANCAL D	FOION					
MECHANICAL DESIGN								
DESIGN PRESSURE 2.5/-0.4 CODES: ASME (YES) (NO		EMPERATURE _ (NO 🗵		F CORROS				
CODES: ASME (YES) (NO	X) STAMP (YES	(NO 🗷) OTHER .		NUCLEAR GR	WDE		
CODES: ASME (YES) (NO	STRUCTION	(NO 🗵		NO	NUCLEAR GR	RATING		
CODES: ASME (YES) (NO MATERIALS OF CON FILTER CASE	STAMP (YES STRUCTION 316L SS	(NO X) *CON) OTHER .	NO 1	NUCLEAR GR	RATING 150 #		
CODES: ASME (YES) (NO MATERIALS OF CON FILTER CASE FILTER COVER	STAMP (YES STRUCTION 316L SS 316L SS	(NO X) *CON INLET OUTLET) OTHER .	NO	NUCLEAR GR	RATING		
CODES: ASME (YES) (NO MATERIALS OF CON FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS	STAMP (YES STRUCTION 316L SS	(NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO II) OTHER .	NO 1	NUCLEAR GR	RATING 150 #		
CODES: ASME (YES) (NO MATERIALS OF CON FILTER CASE FILTER COVER	STAMP (YES STRUCTION 316L SS 316L SS	(NO X) *CON INLET OUTLET) OTHER .	NO 1	NUCLEAR GR	RATING 150 #		
CODES: ASME (YES) (NO MATERIALS OF CON FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS	STAMP (YES STRUCTION 316L SS 316L SS	(NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO III) (NO II) OTHER .	NO 1	NUCLEAR GR	RATING 150 #		
MATERIALS OF CONFILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS	STAMP (YES STRUCTION 316L SS 316L SS 316L SS	(NO X) COP INLET OUTLET VENT DRAIN) OTHER .	NO 1	NUCLEAR GR	RATING 150 #		
MATERIALS OF CONFILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS	STAMP (YES STRUCTION 316L SS 316L SS 316L SS	(NO X) COP INLET OUTLET VENT DRAIN) OTHER .	NO 1	NUCLEAR GR	RATING 150 #		
CODES: ASME (YES) (NO MATERIALS OF CON FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS	STAMP (YES STRUCTION 316L SS 316L SS 316L SS MUCLEAR GRADE	(NO X) *COP INLET OUTLET VENT DRAIN INSTRUMI) OTHER .	NO 1	NUCLEAR GR	PATING 150 # 150 #		
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MATERIALS OF CONFILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED DAVIT (YES) (NO 🗵):	STAMP (YES STRUCTION 316L SS 316L SS 316L SS MUCLEAR GRADE HOOCH RESISTANT FON (X), SWING BOLTE FILTER CASE SUPPORT	PALL CON *ALL CON *COP INLET OUTLET VENT DRAIN INSTRUMI *ALL CON CD-ON (), CLAN S (YES (X)) (I	OTHER . INECTIONS INECTIONS 2° AIRON (_), SCRI	NO 1 1 NO LARGER SHEWED (), SPE	SIZE 3° 3° KALL BE FLANGED CIAL (), - SEE N	PATING 150 # 150 #		
MATERIALS OF CONFILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED	STAMP (YES STRUCTION 316L SS 316L SS 316L SS MUCLEAR GRADE HOOOH RESISTANT ON (X), SWING BOLTE FILTER CASE SUPPORT PAINT PRIME	PALL CON (), CLAMS (YES ()) (NO ())	OTHER . INECTIONS 2° A IPON (_), SCRI NO [_]) MINIM NO [X])	NO 1 1 NO LARGER SHEWED (), SPE	SIZE 3° 3° KALL BE FLANGED CIAL (), - SEE N	PATING 150 # 150 #		
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MATERIALS OF CON FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED DAVIT (YES) (NO): SANDBLAST (YES) (NO): MFR NO REQ'D NO ELEMENTS EACH FILTER	STRUCTION 316L SS 316L SS 316L SS 316L SS MUCLEAR GRADE HOOCH RESISTANT FON (X), SWING BOLTE FILTER CASE SUPPORT PAINT PRIME TO OPERATING SIZE	*ALL CON S (YES) (I) ATA BY VEND	OTHER	NO 1 1 1 ND LARGER SHEWED (), SPE	SIZE SIZE 3* 3* 4ALL BE FLANGED CIAL (_), - SEE N	RATING 150 # 150 #		
MATERIALS OF CON FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED DAVIT (YES) (NO): SANDBLAST (YES) (NO): MFR NO REQ'D	STRUCTION 316L SS 316L SS 316L SS 316L SS MUCLEAR GRADE HOOCH RESISTANT HON (X), SWING BOLTE FILTER CASE SUPPORT PAINT PRIME NO OPERATING PACITY PACITY	*ALL CON S (YES) (I) ATA BY VEND	OTHER INECTIONS 2° A IPON (_), SCRI NO [_]) MINIM NO [X]) ORS NO SPARE "STR	NO 1 1 ND LARGER SHEWED (), SPENUM HEIGHT	SIZE 3° 3° 4ALL BE FLANGED CIAL (_), - SEE N	RATING 150 # 150 #		
MATERIALS OF CON FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED DAVIT (YES) (NO): SANDBLAST (YES) (NO): MFR NO REQ'D	STRUCTION 316L SS 316L SS 316L SS MUCLEAR GRADE HOOCH RESISTANT HOOCH RESISTANT PAINT PRIME NO OPERATING SIZE PACITY PSI: SHIPP	*ALL CON S (YES) (I) ATA BY VEND	OTHER INECTIONS 2° A IPON (_), SCRI NO [_]) MINIM NO [X]) ORS NO SPARE "STR	NO 1 1 ND LARGER SHEWED (), SPENUM HEIGHT	SIZE 3° 3° HALL BE FLANGED CIAL (_), - SEE N	RATING 150 # 150 #		
MATERIALS OF CON FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED DAVIT (YES) (NO): SANDBLAST (YES) (NO): MFR NO REQ'D	STRUCTION 316L SS 316L SS 316L SS MUCLEAR GRADE HOOCH RESISTANT HOOCH RESISTANT PAINT PRIME NO OPERATING SIZE PACITY PSI: SHIPP	PALL CON *ALL CON *CON INLET OUTLET VENT DRAIN INSTRUMI *ALL CON CD-ON (), CLAM S (YES () (I) R (YES ()) CATA BY VEND *CU FT:	OTHER INECTIONS 2° A IPON (_), SCRI NO [_]) MINIM NO [X]) ORS NO SPARE "STR	NO 1 1 ND LARGER SHEWED (), SPENUM HEIGHT	SIZE 3° 3° HALL BE FLANGED CIAL (_), - SEE N	PATING 150 # 150 #		
MATERIALS OF CON FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED DAVIT (YES) (NO): SANDBLAST (YES) (NO): MFR NO REQ'D NO ELEMENTS EACH FILTER TOTAL ELEMENT DIRT HOLDING CAI CLEAN PRESSURE DROP DESCRIBE METHOD OF REMOVING	STRUCTION 316L SS 316L SS 316L SS 316L SS NUCLEAR GRADE HCOOH RESISTANT CON (X), SWING BOLTE FILTER CASE SUPPORT PAINT PRIME O OPERATING SIZE PACITY PSI: SHIPP ELEMENTS:	*ALL CON S (YES) (I R (YES) (I DATA BY VEND ING WEIGHT	OTHER INECTIONS INECTIONS 2° AI IPON (_), SCRI NO [_]) MININ NO [X]) ORS NO SPARE *STR	NO 1 1 1 ND LARGER SHEWED (, SPENUM HEIGHT	SIZE SIZE 3* 3* ALL BE FLANGED CIAL (_), - SEE N	PATING 150 # 150 #		
MATERIALS OF CON FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED DAVIT (YES) (NO): SANDBLAST (YES) (NO): MFR	STAMP (YES STRUCTION 316L SS 316L SS 316L SS NUCLEAR GRADE HOOCH RESISTANT HOOCH RESISTANT PAINT PRIME NO OPERATING SIZE PACITY PSI: SHIPP ELEMENTS: D (YES []) (NO []	*ALL CON S (YES (YES (YES (YES (YES (YES (YES (YE	OTHER - HECTIONS ENTS INECTIONS 2° AI IPON (_), SCRI NO [_) MININ NO [X]) ORS NO SPARE *STR	NO 1 1 1 ND LARGER SHEWED (), SPEIUM HEIGHT	SIZE 3° 3° ALL BE FLANGED CIAL (_), - SEE N	RATING 150 # 150 # NOTES)		
MATERIALS OF CONFILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED DAVIT (YES) (NO): SANDBLAST (YES) (NO): MFR	STAMP (YES STRUCTION 316L SS 316L SS 316L SS NUCLEAR GRADE HCOOH RESISTANT HOOH RESISTANT HOO OPERATING SIZE PACITY PSI: SHIPP ELEMENTS: D (YES []) (NO [] LUDE INITIAL SET OF FILLING INTERPRENTE I	*ALL CON S (YES) (I R (YES) (I DATA BY VEND S FILTER IN TERING ELEMEN *CON *ACCON *ALL CON	OTHER - INECTIONS INECTIONS 2" AI IPON (_), SCRI NO [_]) MININ NO [X]) ORS NO SPARE "STR	NO 1 1 ND LARGER SHEWED (), SPEIUM HEIGHT SURFACE I SPECS (YES	SIZE SIZE 3° 3° IALL BE FLANGED CIAL (_), - SEE N TYPE NO	RATING 150 # 150 # NOTES) TO PREVENT		
MATERIALS OF CONFILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED DAVIT (YES) (NO): SANDBLAST (YES) (NO): MFR	STRUCTION 316L SS 316L SS 316L SS 316L SS NUCLEAR GRADE HCOOH RESISTANT HOOH RESISTANT HOO OPERATING SIZE PACITY PSI: SHIPP ELEMENTS: D (YES []) (NO [] LUDE INITIAL SET OF FIL ERATURE AT GAS ENTE	*ALL CON S (YES) (I PATA BY VEND S FILTER IN TERING ELEMEN RING HEPA IS INI	OTHER - HNECTIONS ENTS INECTIONS 2" AI IPON (_), SCRI NO [_]) MININ NO [X]) ORS NO SPARE "STR I ACCORD WITH ITS. (2) INLET L FLUENCED BY	NO 1 1 1 ND LARGER SHEWED (), SPEIUM HEIGHT SURFACE I SPECS (YES INE TO HEPA I	SIZE SIZE 3° 3° IALL BE FLANGED CIAL (_), - SEE N TYPE NO	RATING 150 # 150 # NOTES) TO PREVENT		
MATERIALS OF CONFILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED DAVIT (YES) (NO): SANDBLAST (YES) (NO): MFR	STRUCTION 316L SS 316L SS 316L SS 316L SS NUCLEAR GRADE HCOOH RESISTANT HOOH RESISTANT HOO OPERATING SIZE PACITY PSI: SHIPP ELEMENTS: D (YES []) (NO [] LUDE INITIAL SET OF FIL ERATURE AT GAS ENTE	*ALL CON S (YES) (I PATA BY VEND S FILTER IN TERING ELEMEN RING HEPA IS INI	OTHER - HNECTIONS ENTS INECTIONS 2" AI IPON (_), SCRI NO [_]) MININ NO [X]) ORS NO SPARE "STR I ACCORD WITH ITS. (2) INLET L FLUENCED BY	NO 1 1 1 ND LARGER SHEWED (), SPEIUM HEIGHT SURFACE I SPECS (YES INE TO HEPA I	SIZE SIZE 3° 3° IALL BE FLANGED CIAL (_), - SEE N TYPE NO	PATING 150 # 150 # 150 # TO PREVENT MAXIMUM		

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DATA SHEET		\sim	-	1		05-14-	92	845734
U.S. Department of Ener Hanford Waste Vitrification	gy						FH-520-0	
Hanford Waste Vitrification Richland, Washington	on Plant					SPECIFICATIO		
DOE Contract DE-AC06-	86RL10838						15896	
		\wedge				FOR CUENT U	JSE	
HEPA FILTERS	5	 				ORIG BY	CHK'D	APPR'D
				1		S.S. Lee		
TITLE	FLOOR DE	WIN CATCH	TANKS VENT	LINE HEPA FILT	ERS			
NO UNITS REQ'D						DRIZONITAL	\ A/EB	TICAL X
TYPE ELEMENT (THROW - AWAY								
		1,17,	CESS DES	IGN				
NAME OF FLUID FILTERED		AIR						
QUANTITY FLUID FILTERED								CFM
OPERATING PRESSURE			HC				•	
OPERATING TEMPERATURE		0.074						°F
DENSITY @ OPER TEMP VISCOSITY @ OPER TEMP		0.071						
ALLOWABLE PRESSURE DROP_AP_		1 0 Clean !	S O Dirty					——.H₂0
NAME OF PARTICLES REMOVED					TICLES			n ₂ 0
MAXIMUM PARTICLE SIZE								MICRONS
MINIMUM PARTICLE SIZE								MICRONS
SIZE OF PARTICLES TO BE REMOV		99.97% OF	3 MICRONS	AND LARGER				MICRONS
QUANTITY OF PARTICLES TO BE RI						•		# / HR
			ANICAL DE					. ,
<u> </u>								
DESIGN PRESSURE ATMOSPHERIC						SION ALLOW		1/16
CODES: ASME (YES) (NO	LL) STAMP	(YES LJ)	(NO 🔀)	OTHER _		MUCLEAR G	RADE	
MATERIALS OF CON	STRUCTION		*CON	NECTIONS	NO	SI	ZE	T RATING
FILTER CASE	304L SS	•	INLET	120110110	1		r	17411110
FILTER COVER	304L SS		OUTLET				<u>- </u>	
1					1		,-	
FILTER ELEMENT SUPPORTS	304L SS		VENT					
FILTER CASE SUPPORTS			DRAIN					
FILTER CONNECTIONS	304L SS	3	INSTRUME	INTS		<u> </u>		
ELEMENTS								
GASKETS			1					
ł l			TALL COM	NECTIONS 2" AN	D LABOED C	WALL DE ELA	NOED	
į			_					
FILTER COVER TYPE (THRU BOLTED								
DAVIT (YES) (NO 🗷):	FILTER CASE SUF	PORTS (ÆS 🔼) (N	IO 🔲) MINIMU	JM HEIGHT			
SANDBLAST (YES) (NO X):	PAINT	PRIMER (YES 🔲) (M	vo 🛛)				
	grif gar i grif e i	DATA	BY VEND	ORS				
MFR						TYPE N	10	
NO REQ'D:	NO OPERATING _		: 1	NO SPARE				
NO ELEMENTS EACH FILTER	: SIZE .	•c).D	. x*STR:	MATERIAL			
TOTAL ELEMENT DIRT HOLDING CA	PACITY		CU FT:		SURFAC	Æ		SQ FT
CLEAN PRESSURE DROP	PSI:	SHIPPING '						
DESCRIBE METHOD OF REMOVING	ELEMENTS:							
		ω П.	IO FILTED IN	400000 14771	20502 25	о П. <i>п</i> ио		
IS DIMENSIONAL OUTLINE INCLUDE					SPECS (YE	SLJ) (NO	<u>니)</u>	
NOTES: (1) FILTERS BID SHALL (2) FLANDER FILTERS!					EHTED いうに	CC D NOT	INIAL DATE	=n
(2) FLANDER FILTERS ! CAPACITY: 105 CFR		HODEL N	J. G-1 1R CC	PO OR EQUAL.	ILIEN SKE:	CC-D, NOM	INML MAIL	-U
	· · · · · · · · · · · · · · · · · · ·					DAFTTY	N 400'5'	ATION
105\O\$\101\204\84571927.001/WP51/01/2	5/02 4:14==			.		- SAFETY C	JLASSIFIC	ATION _3_
	THE TACKET					•		

DATA SHEET U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 ROUGHING FILTERS NO. BY DATE REVISION DATE O7-06-89 845734 TAG NO. FL-540-001 SPECIFICATION SECT. NO. 15896 FOR CLIENT USE ORIG BY J. Janzen SSL TITLE DES FEED TANK ROUGHING FILTER
DATA SHEET U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 ROUGHING FILTERS DES FEED TANK ROUGHING FILTER DATE CONTRACT 07-06-89 845734 TAG NO. FL-540-001 SPECIFICATION SECT. NO. 15896 FOR CLIENT USE DES FEED TANK ROUGHING FILTER
DATA SHEET U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 ROUGHING FILTERS DES FEED TANK ROUGHING FILTER 07-06-89 845734 TAG NO. FL-540-001 SPECIFICATION SECT. NO. 15896 FOR CLIENT USE ORIG BY CHIKD APPRID J. Janzen SSL
U.S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 ROUGHING FILTERS DES FEED TANK ROUGHING FILTER TAG NO. FL-540-001 SPECIFICATION SECT NO 15896 FOR CUENT USE ORIG BY J. Janzen SSL
Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 ROUGHING FILTERS DES FEED TANK ROUGHING FILTER FE.SAU-07 SPECIFICATION SECT. NO. 15896 FOR CLIENT USE ORIG BY J. Janzen SSL
ROUGHING FILTERS 15896 FOR CUENT USE ORIG BY J. Janzen SSL TITLE DES FEED TANK ROUGHING FILTER
ROUGHING FILTERS ORIG BY CHICD APPRID J. Janzen SSL TITLE DES FEED TANK ROUGHING FILTER
J. Janzen SSL TITLE
TITLE DES FEED TANK ROUGHING FILTER
) III.E
NO UNITS REQ'D NO UNITS OPERATING SPARE TYPE (HORIZONTAL) (VERTICAL X
TYPE ELEMENT (THROW - AWAY X) (CLEANABLE) OTHER
PROCESS DESIGN
NAME OF FLUID FILTERED DIATOMACEOUS EARTH DUST FROM VENT STREAM
QUANTITY FLUID FILTERED 234 (55 ACFM) #/H
OPERATING PRESSURE
OPERATING TEMPERATURE
DENSITY @ OPER TEMP LB / FI VISCOSITY @ OPER TEMP C
ALLOWABLE PRESSURE DROP_AP 1.0 Clean, 5.0 Dirty "H,
NAME OF PARTICLES REMOVED
MAXIMUM PARTICLE SIZE See Note 2 MICRON
MINIMUM PARTICLE SIZE MICRON SIZE OF PARTICLES TO BE DEMOVED See Note 2 MICRON
SIZE OF PARTICLES TO BE REMOVED MICRON QUANTITY OF PARTICLES TO BE REMOVED # / H
MECHANICAL DESIGN
DESIGN PRESSURE 51-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16 TOTAL
DESIGN PRESSURE 51-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16 TOTAL
DESIGN PRESSURE 51-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16" TOTAL CODES: ASME (YES ()) (NO (X)) STAMP (YES ()) (NO (X)) OTHER
DESIGN PRESSURE 51-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16" TOTAL CODES: ASME (YES) (NO) STAMP (YES) (NO) OTHER MATERIALS OF CONSTRUCTION *CONNECTIONS NO SIZE RATING
DESIGN PRESSURE 51-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16" TOTAL CODES: ASME (YES ()) (NO (X)) STAMP (YES ()) (NO (X)) OTHER MATERIALS OF CONSTRUCTION *CONNECTIONS NO SIZE RATING FILTER CASE 304L SS INLET 1 3" 150# FILTER COVER 304L SS OUTLET 1 3" 150# FILTER ELEMENT SUPPORTS 304L SS VENT NIA
DESIGN PRESSURE 51-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16" TOTAL CODES: ASME (YES []) (NO [X]) STAMP (YES []) (NO [X]) OTHER MATERIALS OF CONSTRUCTION °CONNECTIONS NO SIZE RATING FILTER CASE 304L SS INLET 1 3" 150# FILTER COVER 304L SS OUTLET 1 3" 150# FILTER ELEMENT SUPPORTS 304L SS VENT N/A FILTER CASE SUPPORTS DRAIN N/A
DESIGN PRESSURE 51-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16" TOTAL CODES: ASME (YES []) (NO [X]) STAMP (YES []) (NO [X]) OTHER MATERIALS OF CONSTRUCTION °CONNECTIONS NO SIZE RATING FILTER CASE SUPPORTS OUTLET 1 3" 150# 150# FILTER ELEMENT SUPPORTS OUTLET 1 3" 150# FILTER CASE SUPPORTS DRAIN N/A FILTER CONNECTIONS 304L SS INSTRUMENTS 2 1/2" NPT(F)
DESIGN PRESSURE 51-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16" TOTAL CODES: ASME (YES ()) (NO (X)) STAMP (YES ()) (NO (X)) OTHER MATERIALS OF CONSTRUCTION *CONNECTIONS NO SIZE RATING FILTER CASE 304L SS INLET 1 3" 150# FILTER COVER 304L SS OUTLET 1 3" 150# FILTER CLEMENT SUPPORTS DRAIN NIA FILTER CASE SUPPORTS DRAIN NIA FILTER CONNECTIONS 304L SS INSTRUMENTS 2 1/2" NPT(F) ELEMENTS
DESIGN PRESSURE 51-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16" TOTAL CODES: ASME (YES []) (NO [X]) STAMP (YES []) (NO [X]) OTHER MATERIALS OF CONSTRUCTION °CONNECTIONS NO SIZE RATING FILTER CASE SUPPORTS OUTLET 1 3" 150# 150# FILTER ELEMENT SUPPORTS OUTLET 1 3" 150# FILTER CASE SUPPORTS DRAIN N/A FILTER CONNECTIONS 304L SS INSTRUMENTS 2 1/2" NPT(F)
DESIGN PRESSURE 51-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16" TOTAL CODES: ASME (YES ()) (NO (X)) STAMP (YES ()) (NO (X)) OTHER MATERIALS OF CONSTRUCTION *CONNECTIONS NO SIZE RATING FILTER CASE 304L SS INLET 1 3" 150# FILTER COVER 304L SS OUTLET 1 3" 150# FILTER CLEMENT SUPPORTS DRAIN NIA FILTER CASE SUPPORTS DRAIN NIA FILTER CONNECTIONS 304L SS INSTRUMENTS 2 1/2" NPT(F) ELEMENTS
DESIGN PRESSURE 5/0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16* TOTAL CODES: ASME (YES []) (NO [X]) STAMP (YES []) (NO [X]) OTHER MATERIALS OF CONSTRUCTION °CONNECTIONS NO SIZE RATING FILTER CASE 304L SS INLET 1 3° 150# FILTER COVER 304L SS OUTLET 1 3° 150# FILTER ELEMENT SUPPORTS VENT N/A FILTER CASE SUPPORTS DRAIN N/A FILTER CONNECTIONS 304L SS INSTRUMENTS 2 1/2° NPT(F) ELEMENTS GASKETS *ALL CONNECTIONS 2° AND LARGER SHALL BE FLANGED
DESIGN PRESSURE 5/0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16 TOTAL CODES: ASME (YES []) (NO [X]) STAMP (YES []) (NO [X]) OTHER MATERIALS OF CONSTRUCTION °CONNECTIONS NO SIZE RATING FILTER CASE 304L SS INLET 1 3° 150\$ FILTER COVER 304L SS OUTLET 1 3° 150\$ FILTER CASE SUPPORTS ORAIN N/A FILTER CASE SUPPORTS DRAIN N/A FILTER CONNECTIONS 304L SS INSTRUMENTS 2 1/2' NPT(F) ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOLTED-ON (_), CLAMP-ON (_), SCREWED (_), SPECIAL (_), - SEE NOTES)
DESIGN PRESSURE 5-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16 TOTAL CODES: ASME (YES []) (NO [X]) STAMP (YES []) (NO [X]) OTHER MATERIALS OF CONSTRUCTION °CONNECTIONS NO SIZE RATING FILTER CASE 304L SS INLET 1 3° 1508 FILTER COVER 304L SS OUTLET 1 3° 1508 FILTER CASE SUPPORTS DRAIN N/A FILTER CASE SUPPORTS DRAIN N/A SIZE RATING N/A
DESIGN PRESSURE 54.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16* TOTAL CODES: ASME (YES []) (NO [X]) STAMP (YES []) (NO [X]) OTHER MATERIALS OF CONSTRUCTION
DESIGN PRESSURE 54.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/16* TOTAL CODES: ASME (YES []) (NO [X]) STAMP (YES []) (NO [X]) OTHER MATERIALS OF CONSTRUCTION
DESIGN PRESSURE 54-0.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1116* TOTAL CODES: ASME (YES]) (NO] STAMP (YES]) (NO] OTHER MATERIALS OF CONSTRUCTION °CONNECTIONS NO SIZE RATING FILTER CASE 304L SS INLET 1 3° 150.6 FILTER COVER 304L SS OUTLET 1 3° 150.6 FILTER ELEMENT SUPPORTS DAIL SS VENT N/A FILTER CASE SUPPORTS FILTER CASE SUPPORTS DAIN N/A INSTRUMENTS 2 11/2 NPT(F) ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (), SWING BOLTED-ON (), CLAMP-ON (), SCREWED (), SPECIAL (), - SEE NOTES) DAVIT (YES] (NO] : FILTER CASE SUPPORTS (YES] (NO]) MINIMUM HEIGHT SANDBLAST (YES] (NO] : PAINT PRIMER (YES]) (NO]) DATA BY VENDORS TYPE NO
DESIGN PRESSURE
DESIGN PRESSURE St-0.4
DESIGN PRESSURE
DESIGN PRESSURE SF0.4 PSIG DESIGN TEMPERATURE 180 "F CORROSION ALLOWANCE 1/16 TOTAL CODES: ASME (YES □) (NO ☒) STAMP (YES □) (NO ☒) OTHER
DESIGN PRESSURE SF-0.4 PSIG DESIGN TEMPERATURE 150 "F CORROSION ALLOWANCE 116 TOTAL
DESIGN PRESSURE St.0.4
DESIGN PRESSURE SF-0.4 PSIG DESIGN TEMPERATURE 150 "F CORROSION ALLOWANCE 116 TOTAL

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FLUOR DANIEL		NO.	BY	REVIS	ION	SHEET NO.	PEV.
3			DATE			P33B-DS	
DATA SHEET	<u>-</u>					DATE	CONTRACT
						08-31-89	845734
U.S. Department of Ener Hanford Waste Vitrification	így on Plant	\wedge				1	40-002
 Richland, Washington 			_ <u></u>			SPECIFICATION SEC	
DOE Contract DE-AC06-	86RL10838	KA				FOR CLIENT USE	5896
ROUGHING FILTI	FDS	\triangle \vdash					D APPRIO
1100GrintGriEn	LINO						SSL APPRO
	tro: mr	O1 140 PT				G.D. 1080	
TITLE				OUGHING FILTE			
NO UNITS REQ'D 1	NO UNITS OP	ERATING		SPARE	TYPE (HOR	IZONTAL)	WERTICAL X)
TYPE ELEMENT (THROW - AWAY	() (CLEANABLE) 0	THER		··	
<u> </u>			CESS DES				-
NAME OF FLUID FILTERED	ZEOLITE DUST FRO						
QUANTITY FLUID FILTERED	~	4 (55 AC	FM)			·	#/HR
OPERATING PRESSURE		0.1					
OPERATING TEMPERATURE		7					
DENSITY @ OPER TEMP		0.071					LB / FT ³
VISCOSITY @ OPER TEMP							C _P
ALLOWABLE PRESSURE DROP_AP_		0 Clean, t				<u>-</u>	'H₂O
NAME OF PARTICLES REMOVED		OLITE PO					
MAXIMUM PARTICLE SIZE	_	o Note 2					_ MICRONS
MINIMUM PARTICLE SIZE		e Note 2 e Note 2					MICRONS
SIZE OF PARTICLES TO BE REMOV	LU						MICRONS
QUANTITY OF PARTICLES TO BE RI	EMOVED	O MUIG Z					#/HR
			ANICAL DE				
		N TEMP	ERATURE	150°F	CORROS	ION ALLOWANCE	1/16
CODES: ASME (YES) (NO	X) STAMP (YES 🔲	(NO 🗷)	OTHER _			
			r		·	·	
MATERIALS OF CON		. ··		NECTIONS	NO	SIZE	RATING
FILTER CASE	304L SS		INLET		1	3	150#
FILTER COVER	304L SS		OUTLET		1	3*	150#
FILTER ELEMENT SUPPORTS	304L SS		VENT		NIA	<u> </u>	
FILTER CASE SUPPORTS			DRAIN		N/A		
FILTER CONNECTIONS	304L SS		INSTRUME	NTS	2	1/2*	NPT(F)
ELEMENTS			1			,	
GASKETS	· · · · · · · · · · · · · · · · · · ·]				
1			ALL COM	ECTIONS 2º AN	D LABGED CH	ALL BE FLANGE	`
ļ	 -		-				
FILTER COVER TYPE (THRU BOLTED							
DAVIT (YES D)_(NO 12):						<u> </u>	
SANDBLAST (YES 1) (NO 12):							
		DATA	BY VEND	ORS			
MFR						TYPE NO	
NO REQ'D:	NO OPERATING		: N	O SPARE			
NO ELEMENTS EACH FILTER	: SIZE	•o).D	x 'STR:	MATERIAL	-	
TOTAL ELEMENT DIRT HOLDING CA							
							·
CLEAN PRESSURE DROP			WEIGHT				
DESCRIBE METHOD OF REMOVING	ELEMENTS:						
IS DIMENSIONAL OUTLINE INCLUDE	D (YES D) (NO		IS FILTER IN	ACCORD WITH	SPECS (YES	□) (NO □)	
NOTES: (1) FILTERS BID SHALL IN							
(2) MUST MEET A MINIMU	JM GROUP III ASHRA	AE 52-76	EFFICIENCY	RATING.		SAFETY CLASS	IFICATION 3
105\OS\101\204\84571906.001/WP51/01/2						3.2.1.02.00	

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FLUOR DANIEL		NO.	BY	RE	VISION	SHEET NO.		REV.
3			DATE			P33B-D		TRACT
DATA SHEE	т	K.Y						
						05-06-90 TAG NO.		845734
U.S. Department of Ene Hanford Waste Vitrificati	rgy ion Plant	N-					L-540-00	3
Richland, Washington						SPECIFICATION S		
DOE Contract DE-AC06	-86RL10838					FOR CLIENT USE	15896	
ROUGHING FILT	FRS					ORIG BY C	HK'D	APPR'D
11000111101121		\square	· · · · · · · · · · · · · · · · · · ·			S.S. Lee	KJM	Arrhu
	D.C.O.U.O.O.	K Y	*******			9.0. <u>2.00</u>		
TITLE				ROUGHING F				
NO UNITS REQ'D	NO UNITS OP	ERATING		SPARE	_ TYPE (HOP	RIZONTAL) (VERT	CAL X
TYPE ELEMENT (THROW - AWAY	K) (CLEANABLE) 0	THER	<u> </u>			
	Law Ber		CESS DES					
NAME OF FLUID FILTERED	TRISODIUM PHOS	PHATE FA	OM VENT SY	TEM	·			
QUANTITY FLUID FILTERED	z	34.3 0.1						#/HR
OPERATING PRESSURE		<u>0.1</u> 77						PSIG PSIG
OPERATING TEMPERATURE DENSITY @ OPER TEMP								LB / FT
VISCOSITY @ OPER TEMP								C _P
ALLOWABLE PRESSURE DROP_AP.		O Clean,		A A COMPA				•H₂O
NAME OF PARTICLES REMOVED _		se (TRISC se Note 2	DIUM PHOSE	HATE)				MODONO
MAXIMUM PARTICLE SIZE		ee Note 2						MICRONS
SIZE OF PARTICLES TO BE REMOV		ee Note 2						MICRONS
QUANTITY OF PARTICLES TO BE R		es Note 2						# / HR
20.1111.07		MECAL	ANICAL DE	CICNI				
***					°E 005500	ION ALLOWAN	105	1716-
DESIGN PRESSURE 5/0.4 CODES: ASME (YES) (NO			ERATURE	750 OTHER			NCE	
MATERIALS OF COM	NSTRUCTION		*CON	NECTIONS	NO	SIZE	·	RATING
FILTER CASE	304L SS		INLET		1	3*		150#
FILTER COVER	304L SS		OUTLET		1	3*		150#
FILTER ELEMENT SUPPORTS	304L SS		VENT		N/A			130#
	3071.33		4		<u> </u>			
FILTER CASE SUPPORTS			DRAIN		N/A			
FILTER CONNECTIONS	304L SS		INSTRUME	NTS	2	1/2*		MPT(F)
ELEMENTS			1					
GASKETS			1					
			┥			!		ł <u> </u>
] "ALL CON	NECTIONS 2"	AND LARGER SH	ALL BE FLANC	3ED	
			-	_				
DAVIT (YES 🗆) (NO 🗷):	FILTER CASE SUPF	PORTS (YES 🔼) (N	OLI) MINI	MUM HEIGHT _			
SANDBLAST (YES 🔲) (NO 🖾)	: PAINT P	RIMER (YES 🔲) (N	ю 🗷)				
	a to the	DATA	BY VEND	ORS	A Paragraphy			
MFR						TYPE NO.		
NO REQ'D:	NO OPERATING		: N	IO SPARE				
NO ELEMENTS EACH FILTER								
TOTAL ELEMENT DIRT HOLDING C					SURFACE			SQ FT
CLEAN PRESSURE DROP	PSI: S	HIPPING	WEIGHT					
DESCRIBE METHOD OF REMOVING					·			
IS DIMENSIONAL OUTLINE INCLUD			-		H SPECS (YES	□) (NO □	<u> </u>	
NOTES: (1) FILTERS BID SHALL II	NCLUDE INITIAL SET	OF FILTE	RING ELEME	NTS.				
(2) MUST MEET A MINIM	IUM GROUP III ASHR	AE 52-76	EFFICIENCY	RATING.				
						SAFETY CLA	\SSIFIC#	TION 3
105\O\$\101\204\84571907.001/WP51/01/	25/93 4:17pm					1		
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DATA SHEET	[]			DATE		VTRACT
1				05-06-8 TAG NO.	10	845734
U.S. Department of Energy Hanford Waste Vitrification	Plant A			L	FL-540-00	Н
Richland, Washington DOE Contract DE-AC06-86	DI 10000			SPECIFICATION	N SECT. NO. 15896	
DOE CONTROCT DE-ACOG-86	nL10838			FOR CLIENT U		
ROUGHING FILTER	s [X			ORIG BY	CHKD	APPR'D
				S.S. Lee	KM	
TITLE	OKALIC ACID DECO	N MAKEUP TANK ROUGHING F	LTER			
NO UNITS REQ'D 1	NO UNITS OPERATING		TYPE (HO	RIZONTAL) (VERI	TICAL X
TYPE ELEMENT (THROW - AWAY)	(CLEANABLE	OTHER	·			
		OCESS DESIGN	+ 4 * 			
NAME OF FLUID FILTEREDQ						#/HP
OPERATING PRESSURE	- 0.1					PSIG
OPERATING TEMPERATURE						
DENSITY @ OPER TEMP						C
ALLOWABLE PRESSURE DROP_AP	1.0 Сіевл,	, 5.0 Dirty CID POWDER		**		
NAME OF PARTICLES REMOVED MAXIMUM PARTICLE SIZE						MICRONS
MINIMUM PARTICLE SIZE	See Note		-			MICRONS
SIZE OF PARTICLES TO BE REMOVED. QUANTITY OF PARTICLES TO BE REMO						MICRONS # / HR
	MEC	HANICAL DESIGN				i
DESIGN PRESSURE 5/0.4 P		PERATURE 150 °F	CORROS	ION ALLOWA	ANCE	1/15
DESIGN PRESSURE 5/-0.4 PCODES: ASME (YES) (NO X) (NO X) OTHER				
MATERIALS OF CONSTE	LICTION	*CONNECTIONS	NO	Siz	E	RATING
FILTER CASE	304L SS	INLET	1	3"		150#
FILTER COVER	304L SS	OUTLET	1	3*		150#
FILTER ELEMENT SUPPORTS	304L SS	VENT	N/A	 		1.002
FILTER CASE SUPPORTS	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	DRAIN	NIA	<u> </u>		
FILTER CONNECTIONS	304L SS	INSTRUMENTS	2	1/2)	NPT(F)
ELEMENTS						
GASKETS						
ļ 		*ALL CONNECTIONS 2" AN	ID I ABCED CH	ALL DE ELAN	IOED	<u>. </u>
50.750 00.050 D.D. G. 100.0 00.750 00.						
FILTER COVER TYPE (THRU BOLTED-ON				_		•
DAVIT (YES) (NO X): FIL						
SANDBLAST (YES) (NO X):						
	DAT	A BY VENDORS				
MFR				TYPE NO		
NO REQ'D: NO	OPERATING	: NO SPARE				
NO ELEMENTS EACH FILTER						
TOTAL ELEMENT DIRT HOLDING CAPAC						
1						
CLEAN PRESSURE DROP	PSI: SHIPPING	WEIGHT		<u> </u>		
DESCRIBE METHOD OF REMOVING ELE	MENTS:				_	
IS DIMENSIONAL OUTLINE INCLUDED	(YES) (NO)	IS FILTER IN ACCORD WITH	SPECS MES		٦,	
NOTES: (1) FILTERS BID SHALL INCLU			(120	, (NO L		
(2) MUST MEET A MINIMUM (· ··· · · · · · · · · · · · · · · · ·			<u> </u>	 .	
		EFFICIENCY MATING.		SAFETY CL	ASSIFICA	TION 3
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3	<u> </u>	DAIE	<u> </u>		P33B-DS		0			
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U.S. Department of Energy Hanford Waste Vitrification	Plant	J			FL.	540-005	5			
Richland, Washington	Richland, Washington						SPECIFICATION SECT. NO.			
DOE Contract DE-AC06-86	DOE Contract DE-AC06-86RL10838									
ROUGHING FILTER	ODIC BY I CH	ORIG BY CHK'D APPR'D								
	· /^	J	_		S.S. Lee	KJM	12,,,,,			
	KM-O M	NKE UP TANK ROU	ICHING EILTED							
TITLE										
NO UNITS REQ'D 1					RIZONTAL)	(VERT	ICAL X)			
TYPE ELEMENT (THROW - AWAY X)	(CLEANABLE) (THER							
		PROCESS DES	SIGN							
NAME OF FLUID FILTERED	Mino, POWDER FROM	VENT SYSTEM								
QUANTITY FLUID FILTERED	234.3						#/HR			
OPERATING PRESSURE							PSIG			
OPERATING TEMPERATURE										
DENSITY @ OPER TEMP		771					LB / FT ³			
VISCOSITY @ OPER TEMP		ean, 5.0 Dirty								
ALLOWABLE PRESSURE DROP_AP	104.0	, DUST					'H₂O			
NAME OF PARTICLES REMOVED MAXIMUM PARTICLE SIZE	A N						MICRONS			
MINIMUM PARTICLE SIZE	See N	ote 2					MICRONS			
SIZE OF PARTICLES TO BE REMOVED MICHON										
QUANTITY OF PARTICLES TO BE REM							# / HR			
			FOION							
5/04		ECHANICAL DI					- 2/2/8			
		EMPERATURE			ION ALLOWANG)E	1/16*			
CODES: ASME (YES) (NO 🗵) STAMP (YES	(NO 🗷) OTHER _	.=						
MATERIALS OF CONST	RUCTION	*CON	INECTIONS	l NO	SIZE		RATING			
FILTER CASE	304L SS	INLET		1	3*		150#			
FILTER COVER	304L SS	OUTLET		1 7	3"		150#			
FILTER ELEMENT SUPPORTS	304L SS	VENT		N/A	-		100#			
FILTER CASE SUPPORTS		DRAIN		NIA	 					
FILTER CONNECTIONS	304L SS	INSTRUME	ENITE:	2	1/2*		A107.00			
ELEMENTS		ING! HOWE	INIS		1/2		NPT(F)			
 										
GASKETS				<u>.</u>	<u> </u>					
		*ALL CON	NECTIONS 2º AI	ND LARGER SH	IALL BE FLANG	ED				
FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOLTED-ON (_), CLAMP-ON (_), SCREWED (_), SPECIAL (_), - SEE NOTES)										
DAVIT (YES []) (NO [X]): FILTER CASE SUPPORTS (YES [X]) (NO []) MINIMUM HEIGHT										
SANDBLAST (YES (I) (NO (X)): PAINT PRIMER (YES (I) (NO (X))										
SANDBLAST (TES LJ) (NO EE).		ATA BY VEND								
MED	muse of the	MIN DI VILIO	010			 				
MFR				-	TYPE NO _					
NO REQ'D: NO					'					
NO ELEMENTS EACH FILTER : SIZE "O.D x "STR: MATERIAL										
TOTAL ELEMENT DIRT HOLDING CAPACITY CU FT:SURFACESQ FT										
CLEAN PRESSURE DROP PSI: SHIPPING WEIGHT										
DESCRIBE METHOD OF REMOVING ELEMENTS:										
										
IS DIMENSIONAL OUTLINE INCLUDED (YES) (NO) IS FILTER IN ACCORD WITH SPECS (YES) (NO) NOTES: (1) FILTERS BID SHALL INCLUDE INITIAL SET OF FILTERING ELEMENTS.										
(2) MUST MEET A MINIMUM GROUP III ASHRAE 52-76 EFFICIENCY RATING. SAFETY CLASSIFICATION 3										
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]						74G NO.	90	845734
U.S. Department of Ene Hanford Waste Vitrificati	rgy ion Plant			-		TAG NO.	5 5 4 5 6 4	
Richland, Washington	OHFIGHT	 				SPECIFICATIO	FL-540-00)6
DOE Contract DE-AC06	-86RL10838						15896	
ROUGHING FIL	TEDE			1		ORIG BY	CHK'D	APPR'D
NOOGHING FIL	IENS	\land		·		┪		
		<u> V V</u>				S.S. Lee	KJM	
TITLE	NeNO, MAKE	UP TANK I	ROUGHING FIL	TER				
NO UNITS REQ'D1	_			SPARE	TYPE /H	ORIZONTAL	\ WEB	TICAL X
TYPE ELEMENT (THROW - AWAY _				OTHER				110AL
			CESS DES	100				
NAME OF FLUID FILTERED				TEM				
QUANTITY FLUID FILTERED	234.3							#/HF
OPERATING PRESSURE	- 0.1							PSIC
OPERATING TEMPERATURE								
DENSITY @ OPER TEMP								
VISCOSITY @ OPER TEMP ALLOWABLE PRESSURE DROP_AP		5.0 Dirty						C ₁
NAME OF PARTICLES REMOVED				,				"H ₂ C
MAXIMUM PARTICLE SIZE	See Note	2						IБ / НЕ
MINIMUM PARTICLE SIZE								lb / HF
SIZE OF PARTICLES REMOVED QUANTITY PARTICLES TO BE REMO						· · · · · · · · · · · · · · · · · · ·		
GUANTITY PARTICLES TO BE REM	OVED	<u> </u>						Ib / HF
			IANICAL DE	SIGN 150 °F	CORRO	OSION ALLOW	ANCE	1/16
CODES: ASME (YES) (NO	X) STAMP	(YES 🗌) (NO 🖾)	OTHER _		· · · · · · · · · · · · · · · · · · ·		
MATERIALS OF CO	NSTRUCTION		*CON	NECTIONS	NO	SIZ	7F	RATING
FILTER CASE	304L SS		INLET		1	3		150#
FILTER COVER	304L SS		OUTLET		1	3		
FILTER ELEMENT SUPPORTS	304L SS		VENT		N/A	 		150#
FILTER CASE SUPPORTS			DRAIN				·	
FILTER CONNECTIONS	304L SS		- · · · · · · · · · · · · · · · · · · ·		N/A	_		
· · · · · · · · · · · · · · · · · · ·	304L 55		INSTRUME	NIS	2	1/2	<u> </u>	NPT(F)
ELEMENTS			4					<u> </u>
GASKETS			_					<u> </u>
j			ALL CON	NECTIONS 2" AN	D LARGER S	HALL BE FLA	NGED	
FILTER COVER TYPE (THRU BOLTE	D-ON (), SWING B	OLTED-ON	(), CLAMP-O	N (), SCREWED	(), SPECIA	L () - SEE NO	OTES)	
DAVIT (YES []) (NO [X]):						_		
1								
SANDBLAST (YES) (NO 🗵): PAINT PI	RIMER (Y	TES LLI) (No	이즈)				
					. ,			
		DATA	A BA AEND	ORS	e trettile			
MFR						TYPE N		
NO REQ'D:								
NO ELEMENTS EACH FILTER	: SIZE _	•(D.D	x*STR:	MATERIAL			
TOTAL ELEMENT DIRT HOLDING CA	APACITY		CU FT:		SURFAC	E		SQ FT
CLEAN PRESSURE DROP								
DESCRIBE METHOD OF REMOVING								
IS DIMENSIONAL OUTLINE INCLUDE	ED MES D. A	<u>о П′</u>	IS FILTED IN	ACCORD MITH	SPECS AC	<u>е Пу діс</u>		
	(, / (,4	~ _	IS FILIED IN	AUUUND WITH	areus (YE	- I I (N()		
I NOTES: (1) FILTERS BID SHALL	INCLUDE INITIAL S					<u>о ш, (но</u>		

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FLUOR DANIEL	NO.	BY	REVIS	SION	SHEET NO.	REV.			
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DATA CLICET					DATE	CONTRACT			
DATA SHEET	 				05-06-90	845734			
U.S. Department of Energy Hanford Waste Vitrification Plant		-		· · · ·	TAG NO.	T40 007			
Hantord Waste Vitrification Plant	- KA				SPECIFICATION SEC	540-007 CT. NO.			
Richland, Washington DOE Contract DE-AC06-86RL10838									
1					FOR CLIENT USE				
ROUGHING FILTERS					ORIG BY CHK	D APPRID			
					S.S. Lee	KIM			
TITLE SUGAR	SOLUTION N	MAKEUP TANK	ROUGHING FIL	TER					
		4							
NO UNITS REQ'D 1 NO UNITS				TYPE (HOI	RIZONTAL)	(VERTICAL A)			
TYPE ELEMENT (THROW - AWAY) (CLEANABLE) o	THER						
	PRO	CESS DES	IGN	-4 1					
NAME OF FLUID FILTERED SUGAR POWDE	R FROM VEN	IT SYSTEM	· · · · · · · · · · · · · · · · · · ·						
QUANTITY FLUID FILTERED	234.3					#/HR			
OPERATING PRESSURE	- 0.1					PSIG			
OPERATING TEMPERATURE	77					°F			
DENSITY @ OPER TEMP	0.071					LB / FT ³			
VISCOSITY @ OPER TEMP						C _P			
ALLOWABLE PRESSURE DROP_AP	1.0 Clean,								
NAME OF PARTICLES REMOVED	SUGAR DU								
MAXIMUM PARTICLE SIZE			·			MICRONS			
MINIMUM PARTICLE SIZE						MICRONS			
SIZE OF PARTICLES TO BE REMOVED						MICRONS			
QUANTITY OF PARTICLES TO BE REMOVED	See Note 2			· · · · · ·		#/HR			
<u> </u>	MECH	ANICAL DE	SIGN						
DESIGN PRESSURE 5/0.4 PSIG DE		ERATURE				c 1/16°			
L					ION ALLOWANC	E			
CODES: ASME (YES) (NO 🗵) STAMP	YES L)	(NO 🔀)	OTHER _						
MATERIALS OF CONSTRUCTION		*CON	MECTIONS	NO.	SIZE	RATING			
FILTER CASE 304L S	35	INLET		1 1	32				
FILTER COVER 304L S		OUTLET		1	3-	150#			
		1			3	150#			
	N	VENT		N/A					
FILTER CASE SUPPORTS		DRAIN		N/A					
FILTER CONNECTIONS 304L S	S	INSTRUMEN	чтs	2	1/2"	NPT(F)			
ELEMENTS									
GASKETS		1			··				

		ATT CONN	ECTIONS 2" AN	D LARGER SH	ALL BE FLANGE	D			
FILTER COVER TYPE (THRU BOLTED-ON (), SWING	BOLTED-ON	I (), CLAMP-	ON (), SCREV	VED (), SPEC	CIAL () SEF	NOTES)			
FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOLTED-ON (_), CLAMP-ON (_), SCREWED (_), SPECIAL (_), - SEE NOTES) DAVIT (YES (_) (NO (_)): FILTER CASE SUPPORTS (YES (_)) (NO (_)) MINIMUM HEIGHT									
SANDBLAST (YES (NO X): PAINT PRIMER (YES (NO X))									
SANDODAS (1ES ES) (NO ES). PAIN		BY VENDO			- · · · · · · · · · · · · · · · · · · ·				
	ערור	DI VENDO	лю			<u> </u>			
MFR					TYPE NO	· · · · · · · · · · · · · · · · · · ·			
NO REQ'D NO OPERATING .		: N	O SPARE		· · · · · · · · · · · · · · · · · · ·				
NO ELEMENTS EACH FILTER: SIZE	' O).D	× 'STR:	MATERIAL _					
TOTAL ELEMENT DIRT HOLDING CAPACITY CU FT: SURFACE SQ FT									
CLEAN PRESSURE DROP PSI: SHIPPING WEIGHT SQ FT									
DESCRIBE METHOD OF REMOVING ELEMENTS:									
IS DIMENSIONAL OUTLINE INCLUDED (YES) (NO) IS FILTER IN ACCORD WITH SPECS (YES) (NO)									
NOTES: (1) FILTERS BID SHALL INCLUDE INITIAL SET OF FILTERING ELEMENTS.									
					SAFETY CLASS	SIFICATION 3			
105\O\$\101\204\84571911.001/WP51/01/25/93 4:31pm									

	<u>Al</u>	TACHMENT	Α							
FLUOR DANIEL	NO.		REVIS	BION	SHEET NO.	REV.				
3		UAIE			P338-DS-14					
DATA SHEET					DATE	CONTRACT				
		· · · · · · · · · · · · · · · · · · ·			05-06-90 TAG NO.	845734				
U.S. Department of Energy Hanford Waste Vitrification Plan	. 🔼				FL-54	0-009				
Richland, Washington	` `\ -				SPECIFICATION SECT.	- +				
DOE Contract DE-AC06-86RL10)838 <u> </u>				158	396				
DO1611110 THEFT					FOR CLIENT USE					
ROUGHING FILTERS	/ ⊼1-				OPIG BY CHK'D	1				
			1		S.S. Lee K	<u> M </u>				
TITLE	OH/FRIT MODIFIER	MAKEUP TAN	K ROUGHING FIL	.TER						
NO UNITS REQ'D NO	LINITS OPERATING	1	CDADE	TODE (HO)	DIZONITAL NA	ESTICAL V				
TYPE ELEMENT (THROW - AWAY X) (CLE					RIZONIAL (V	ERTICAL A)				
TIPE ELEMENT (THROW - AWAY _Z) (CLE			· · · · · · · · · · · · · · · · · · ·	·	-					
		CESS DES								
NAME OF FLUID FILTERED		ROM VENT SY	STEM							
QUANTITY FLUID FILTERED		·	· · · ·			#/HR				
OPERATING PRESSURE	<u> - 0,1</u>					PSIG				
OPERATING TEMPERATURE										
DENSITY @ OPER TEMP	0.071					LB / FT ³				
VISCOSITY @ OPER TEMP			· · · · · · · · · · · · · · · · · · ·			C _P				
ALLOWABLE PRESSURE DROP_AP						H ₂ 0				
NAME OF PARTICLES REMOVED			ROM KOHIFRIT N	<i>IODIFIER</i>						
MAXIMUM PARTICLE SIZE						MICRONS				
MINIMUM PARTICLE SIZE						_ MICRONS				
SIZE OF PARTICLES TO BE REMOVED						MICRONS				
QUANTITY OF PARTICLES TO BE REMOVED # / HR										
MECHANICAL DESIGN										
DESIGN PRESSURE 5/-0.4 PSIG		······································		000000	1011 111 0111110	4 14 04				
CODES: ASME (YES) (NO 🗵)					ION ALLOWANCE					
CODES: ASME (YES L.I) (NO LEI)	STAMP (YES) (NO LA)	OTHER							
MATERIALS OF CONSTRUCT	ON	*CON	NECTIONS	NO	SIZE	RATING				
FILTER CASE	304L SS	INLET		1	3*	150#				
FILTER COVER	304L SS	OUTLET		1	3*					
FILTER ELEMENT SUPPORTS	304L SS	VENT		N/A		150#				
FILTER CASE SUPPORTS		DRAIN								
	304L SS	4		N/A						
FILTER CONNECTIONS	304L 33	INSTRUME	NTS	2	1/2*	MPT(F)				
ELEMENTS		_								
GASKETS										
		T *ALL CONN	JECTIONS 25 AN	D LABGED CH	ALL BE FLANGED					
	· · · · · · · · · · · · · · · · · · ·									
FILTER COVER TYPE (THRU BOLTED-ON ()	SWING BOLTED-O	N (), CLAMP	-ON, SCREV	VED (), SPEC	CIAL (), - SEE NO	OTES)				
DAVIT (YES 🔲)_(NO 🗷):_ FILTER (ASE SUPPORTS (YES 🔼) (N	O 🔲) MINIMU	JM HEIGHT _						
SANDBLAST (YES 1) (NO 12):										
	DATA	BY VENDO	ORS							
MFR	······································			 	TYPE NO					
NO REQ'D: NO OPER	ATING	· N	O CDADE							
NO ELEMENTS EACH FILTER :										
TOTAL ELEMENT DIRT HOLDING CAPACITY .						SQ FT				
CLEAN PRESSURE DROP	PSI: SHIPPING	WEIGHT								
DESCRIBE METHOD OF REMOVING ELEMEN	TS:									
IS DIMENSIONAL OUTLINE INCLUDED YES	<u>니) (NO 니)</u>	IS FILTER IN	ACCORD WITH	SPECS (YES	∐) (NO □)					
NOTES: (1) FILTERS BID SHALL INCLUDE II										
(2) MUST MEET A MINIMUM GROU		EFFICIENCY F	RATING.		SAFETY CLASSIF	ICATION 3				
105\O\$\101\204\84571912.001/WP51/01/25/93 4:32p	m									

	ATTACHMEN	П А										
FLUOR DANIEL	NO. BY	REVISI	ON	SHEET NO.	1	REV.						
9	DATE			P33B-DS-15	CONTRAC	O						
DATA SHEET	 			05-06-90		45734						
U.S. Department of Energy	K.Y.			TAG NO.	<u> </u>							
Hanford Waste Vitrification Plant		 _		FL-54 SPECIFICATION SECT	10-010 NO.							
Richland, Washington DOE Contract DE-AC06-86RL10838				15	896							
i	\wedge			FOR CLIENT USE								
ROUGHING FILTERS				ORIG BY CHK'D	JM A	APPR'D						
	<u> </u>			3.3. L 00 A	<u> </u>							
	CON MAKE-UP TANK	ROUGHING FILTER	<u> </u>									
NO UNITS REQ'D NO UNITS OF	·	SPARE	•	RIZONTAL) (VERTICA	AL_X)						
TYPE ELEMENT (THROW - AWAY X) (CLEANABLE _		OTHER										
		SIGN	:									
NAME OF FLUID FILTEREDKMnO . POWDER F				-								
01 2171110 112000112												
OPERATING TEMPERATURE												
DENSITY @ OPER TEMP	0.071											
VISCOSITY @ OPER TEMP	a Class E A Dish											
	MnO. DUST					'H₂∪						
	ee Note 2				M	IICRONS						
	ee Note 2					IICHONS						
SIZE OF PARTICLES TO BE REMOVEDS						IICRONS						
QUANTITY OF PARTICLES TO BE REMOVEDS					_ '''	#/HR						
MECHANICAL DESIGN												
5/0.4 POIO PEO	DESIGN PRESSURE 51-9.4 PSIG DESIGN TEMPERATURE 150 °F CORROSION ALLOWANCE 1/116°											
·	GN TEMPERATURE _	<u>150</u> °F		ION ALLOWANCE	1/	/16						
		<u>150</u> °F		ION ALLOWANCE	1/	/16						
·	GN TEMPERATURE _ (YES D) (NO X	<u>150</u> °F		ION ALLOWANCE		/16"						
CODES: ASME (YES) (NO 🗵) STAMP	GN TEMPERATURE _ (YES D) (NO X											
CODES: ASME (YES () (NO (X)) STAMP MATERIALS OF CONSTRUCTION	GN TEMPERATURE _ (YES □) (NO 🗵		NO	SIZE		RATING						
CODES: ASME (YES ()) (NO (X)) STAMP MATERIALS OF CONSTRUCTION FILTER CASE 304L SS	GN TEMPERATURE _ (YES] (NO X		NO 1	SIZE 3°		RATING 150#						
CODES: ASME (YES ()) (NO (X)) STAMP MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER 304L SS	GN TEMPERATURE _ (YES []) (NO [X] *COL		NO 1	SIZE 3°		RATING 150#						
CODES: ASME (YES ()) (NO (X)) STAMP MATERIALS OF CONSTRUCTION FILTER CASE 304L SS FILTER COVER 304L SS FILTER ELEMENT SUPPORTS 304L SS	GN TEMPERATURE _ (YES) (NO *COI INLET OUTLET VENT	150 °F) OTHER NINECTIONS	NO 1 1 N/A	SIZE 3°		RATING 150#						
CODES: ASME (YES ()) (NO (X)) STAMP MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CASE SUPPORTS	GN TEMPERATURE _ (YES) (NO) INLET OUTLET VENT DRAIN	150 °F) OTHER NINECTIONS	NO 1 1 N/A N/A	SIZE 3°		RATING 150# 150#						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS STAMP (NO X) STAMP 304L SS 304L SS FILTER CASE SUPPORTS FILTER CONNECTIONS 304L SS	GN TEMPERATURE _ (YES) (NO) INLET OUTLET VENT DRAIN	150 °F) OTHER NINECTIONS	NO 1 1 N/A N/A	SIZE 3°		RATING 150# 150#						
CODES: ASME (YES ()) (NO (X)) STAMP MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS STAMP (NO (X)) STAMP 304L SS 304L SS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS	GN TEMPERATURE _ (YES) (NO INLET OUTLET VENT DRAIN INSTRUM	150 °F) OTHER NNECTIONS ENTS	NO 1 1 NA N/A 2	SIZE 3* 3*		RATING 150# 150#						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS MATERIALS OF CONSTRUCTION 304L SS 304L SS 304L SS	GN TEMPERATURE (YES	150 °F) OTHER NNECTIONS ENTS	NO 1 1 N/A N/A 2 D LARGER SH	SIZE 3* 3* 1/2* ALL BE FLANGED		RATING 150# 150#						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOTTED-ON (_), SWING B	GN TEMPERATURE (YES	150 °F OTHER NNECTIONS ENTS NNECTIONS 2° ANI APON (_), SCREW	NO 1 1 N/A N/A 2 D LARGER SH	SIZE 3* 3* 1/2* ALL BE FLANGED CIAL (_), - SEE N	HOTES)	PATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOLD ON	GN TEMPERATURE (YES) (NO) INLET OUTLET VENT DRAIN INSTRUM *ALL COM OUTLED-ON (_), CLAM PORTS (YES) (150 °F OTHER NNECTIONS ENTS NNECTIONS 2° ANI NNECTIONS 2° ANI NNECTIONS 10	NO 1 1 N/A N/A 2 D LARGER SH	SIZE 3* 3* 1/2* ALL BE FLANGED CIAL (_), - SEE N	HOTES)	PATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOTTED-ON (_), SWING B	GN TEMPERATURE (YES) (NO) *COI INLET OUTLET VENT DRAIN INSTRUM *ALL CON OLTED-ON (), CLAM PORTS (YES) (RIMER (YES))	NNECTIONS NNECTIONS 2° AND PON (), SCREW NO () MINIMU (NO (X))	NO 1 1 N/A N/A 2 D LARGER SH	SIZE 3* 3* 1/2* ALL BE FLANGED CIAL (_), - SEE N	HOTES)	PATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOUT (YES) (NOX): FILTER CASE SUPPORT SANDBLAST (YES) (NOX): PAINT P	GN TEMPERATURE (YES) (NO) INLET OUTLET VENT DRAIN INSTRUM *ALL COM OUTLED-ON (_), CLAM PORTS (YES) (NNECTIONS NNECTIONS 2° AND PON (), SCREW NO () MINIMU (NO (X))	NO 1 1 N/A N/A 2 D LARGER SH ED (_), SPEC	SIZE 3* 3* 1/2* ALL BE FLANGED CIAL (_), - SEE N	IOTES)	PATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOUT (YES) (NOX): FILTER CASE SUPPORT SANDBLAST (YES) (NOX): PAINT P	GN TEMPERATURE (YES) (NO) *COI INLET OUTLET VENT DRAIN INSTRUM *ALL COM OLTED-ON (), CLAM PORTS (YES) (RIMER (YES)) DATA BY VENI	150 °F) OTHER NNECTIONS ENTS NECTIONS 2° ANI AP-ON (_), SCREW NO □) MINIMU (NO □) MINIMU CORS	NO 1 1 N/A N/A 2 D LARGER SH PED (_), SPEC	SIZE 3* 3* 1/2* ALL BE FLANGED CIAL (_), - SEE N	HOTES)	PATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SOUPPORTS FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOUND (THRU BOLTED CON (_), SWING BOUND (_), S	GN TEMPERATURE (YES) (NO) *COLUMN	NNECTIONS NNECTIONS ENTS NNECTIONS 2° AND IP-ON (), SCREW INO () MINIMU (NO ()) DORS NO SPARE	NO 1 1 N/A N/A 2 D LARGER SH ED (_), SPEC	SIZE 3* 3* 1/2* ALL BE FLANGED CIAL (_), - SEE N	IOTES)	RATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOUND (_), SWING	GN TEMPERATURE (YES) (NO INLET OUTLET VENT DRAIN INSTRUM *ALL COM OUTED-ON (_), CLAM PORTS (YES) (RIMER (YES)) DATA BY VENI	NNECTIONS 2° AND NNECTIONS 2° AND NNECTIONS 2° AND NO D) MINIMU NO D) NO SPARE x'STR:	NO 1 1 N/A N/A 2 D LARGER SH ED (_), SPEC M HEIGHT	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL (_), - SEE N	NOTES)	RATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOLD (YES) (NOX): FILTER CASE SUPPORTS SANDBLAST (YES) (NOX): PAINT POPERATING NO REQ'D: NO OPERATING NO ELEMENTS EACH FILTER: SIZE TOTAL ELEMENT DIRT HOLDING CAPACITY:	GN TEMPERATURE (YES) (NO) *COI INLET OUTLET VENT DRAIN INSTRUM *ALL COM OLTED-ON (), CLAM PORTS (YES) (RIMER (YES)) TO DATA BY VENI *O.D CU FT:	150 °F) OTHER NNECTIONS ENTS NNECTIONS 2° ANI IP-ON (_), SCREW INO □) MINIMU (NO ②) DORS NO SPARE*STR:	NO 1 1 N/A N/A 2 D LARGER SH ED (_), SPEC M HEIGHT MATERIAL _ SURFACE	SIZE 3* 3* 1/2* ALL BE FLANGED CIAL (_), - SEE N	NOTES)	RATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOUND (_), SWING	GN TEMPERATURE (YES) (NO) *COI INLET OUTLET VENT DRAIN INSTRUM *ALL COM OLTED-ON (), CLAM PORTS (YES) (RIMER (YES)) TO DATA BY VENI *O.D CU FT:	150 °F) OTHER NNECTIONS ENTS NNECTIONS 2° ANI IP-ON (_), SCREW INO □) MINIMU (NO ②) DORS NO SPARE*STR:	NO 1 1 N/A N/A 2 D LARGER SH ED (_), SPEC M HEIGHT MATERIAL _ SURFACE	SIZE 3* 3* 1/2* ALL BE FLANGED CIAL (_), - SEE N	NOTES)	RATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOUT (YES) (NOX): FILTER CASE SUPPORTS SANDBLAST (YES) (NOX): PAINT POPERATING NO REQ'D: NO OPERATING NO ELEMENTS EACH FILTER: SIZE TOTAL ELEMENT DIRT HOLDING CAPACITY:	GN TEMPERATURE (YES) (NO) *COI INLET OUTLET VENT DRAIN INSTRUM *ALL COM OLTED-ON (), CLAM PORTS (YES) (RIMER (YES)) TO DATA BY VENI *O.D CU FT:	150 °F) OTHER NNECTIONS ENTS NNECTIONS 2° ANI IP-ON (_), SCREW INO □) MINIMU (NO ②) DORS NO SPARE*STR:	NO 1 1 N/A N/A 2 D LARGER SH ED (_), SPEC M HEIGHT MATERIAL _ SURFACE	SIZE 3* 3* 1/2* ALL BE FLANGED CIAL (_), - SEE N	NOTES)	RATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOUND (YES) (NOX): FILTER CASE SUPPORTS SANDBLAST (YES) (NOX): FILTER CASE SUPPORTS MFR NO REQ'D: NO OPERATING NO ELEMENTS EACH FILTER: SIZE TOTAL ELEMENT DIRT HOLDING CAPACITY CLEAN PRESSURE DROP PSI: SIDESCRIBE METHOD OF REMOVING ELEMENTS:	GN TEMPERATURE (YES) (NO) *COI INLET OUTLET VENT DRAIN INSTRUM *ALL COM OLTED-ON (), CLAM PORTS (YES) (RIMER (YES)) DATA BY VENI CU FT: CHIPPING WEIGHT	NNECTIONS NNECTIONS ENTS NNECTIONS 2° ANI AP-ON (_), SCREW NO []) MINIMU NO []) DORS NO SPARE*STR:	NO 1 1 N/A N/A 2 D LARGER SH PED (_), SPEC M HEIGHT MATERIAL SURFACE	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL (_), - SEE N	NOTES)	RATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (_), SWING BOUND (_), SWING	GN TEMPERATURE (YES) (NO) INLET OUTLET VENT DRAIN INSTRUM *ALL CON OLTED-ON (), CLAM PORTS (YES) (RIMER (YES)) DATA BY VENI *O.D	150 °F OTHER NNECTIONS ENTS ENTS PON (_), SCREW (NO [_) MINIMU (NO [_X]) DORS NO SPARE x 'STR:	NO 1 1 N/A N/A 2 D LARGER SH PED (_), SPEC M HEIGHT MATERIAL SURFACE	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL (_), - SEE N	NOTES)	RATING 150# 150# NPT(F)						
MATERIALS OF CONSTRUCTION FILTER CASE FILTER COVER FILTER CASE SOFILER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-ON (), SWING BOUND ()	GN TEMPERATURE	NNECTIONS 2" AND NNECTIONS 2" AND NNECTIONS 2" AND NO CORS NO SPARE X "STR: N ACCORD WITH SENTS.	NO 1 1 N/A N/A 2 D LARGER SH PED (_), SPEC M HEIGHT MATERIAL SURFACE	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL (_), - SEE N	NOTES)	RATING 150# 150# NPT(F)						

FLUOR DANIEL	NO.	BY	REVISION	SHEET NO.	REV.
9		DATE		P33B-DS-16	
DATA SHEET	X			05-06-90	CONTRACT 845734
U.S. Department of Energy	/ 			TAG NO.	
Hanford Waste Vitrification Richland, Washington				FL-540 SPECIFICATION SECT N	
DOE Contract DE-AC06-86	SRL10838			158 FOR CLIENT USE	96
ROUGHING FILTER	s 🛆			ORIG BY CHK'D	APPR'D
	\sim			S.S. Lee KJ	
TITLE	OFF-GAS TREATMENT O	HEMICAL FEED TANK ROUG	HING FILTER		
NO UNITS REQ'D 1	NO UNITS OPERATIO	NG 1 SPARE	TYPE (HO	BIZONTAL \ A	ERTICAL X V
TYPE ELEMENT (THROW - AWAY _X)	(CLEANABLE) OTHER			
		OCESS DESIGN			
NAME OF FLUID FILTERED	IR WITH DRY CHEMICAL	DUST			
QUANTITY FLUID FILTERED					#/HR
OPERATING PRESSURE					PSIG
OPERATING TEMPERATURE					°F
DENSITY @ OPER TEMP VISCOSITY @ OPER TEMP					
ALLOWABLE PRESSURE DROP_AP		n. 5.0 Dirtu			
NAME OF PARTICLES REMOVED					'H ₂ O
MAXIMUM PARTICLE SIZE	See Note	12			MICRONS
MINIMUM PARTICLE SIZE					MICRONS
SIZE OF PARTICLES TO BE REMOVED					MICRONS
QUANTITY OF PARTICLES TO BE REM	OVEDSee_Note	12			#/HR
		HANICAL DESIGN			
DESIGN PRESSUREF	SIG DESIGN TEN	MPERATURE150	-°F CORROS	SION ALLOWANCE _	1/16
CODES: ASME (YES) (NO 🛚) STAMP (YES [D) (NO 🗷) OTHER	·		
CODES: ASME (YES) (NO MATERIALS OF CONST) STAMP (YES	ONNECTIONS		SIZE	
) STAMP (YES) (NO 🗷) OTHER			RATING 150#
MATERIALS OF CONST) STAMP (YES D	ONNECTIONS	NO	SIZE	RATING
MATERIALS OF CONST) STAMP (YES [RUCTION 304L SS	(NO (X)) OTHER *CONNECTIONS INLET	NO 1	SIZE 3°	RATING 150#
MATERIALS OF CONST	THE STAMP (YES ENUCTION 304L SS 304L SS 304L SS	OUTLET OUTLET	NO 1	SIZE 3°	RATING 150#
FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS	THUCTION 304L SS 304L SS	*CONNECTIONS INLET OUTLET VENT	NO 1 1 N/A	SIZE 3°	RATING 150#
FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS	THE STAMP (YES ENUCTION 304L SS 304L SS 304L SS	*CONNECTIONS INLET OUTLET VENT DRAIN	NO 1 1 N/A N/A	\$IZE 3° 3°	RATING 150# 150#
FILTER CASE SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS	THE STAMP (YES ENUCTION 304L SS 304L SS 304L SS	*CONNECTIONS INLET OUTLET VENT DRAIN	NO 1 1 N/A N/A	\$IZE 3° 3°	RATING 150# 150#
FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS	THE STAMP (YES ENUCTION 304L SS 304L SS 304L SS	*CONNECTIONS INLET OUTLET VENT DRAIN	NO 1 1 NIA NIA 2	\$IZE 3° 3°	RATING 150# 150#
FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS	PUCTION 304L SS 304L SS 304L SS 304L SS	*CONNECTIONS INLET OUTLET VENT DRAIN INSTRUMENTS *ALL CONNECTIONS 2*	NO 1 1 N/A N/A 2 AND LARGER SH	SIZE 3° 3° 1/2° ALL BE FLANGED	RATING 150# 150# NPT(F)
FILTER COVER FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-O	PUCTION 304L SS 304L SS 304L SS 304L SS	*ALL CONNECTIONS 2* *ALL CONNECTIONS 2* *ALL CONNECTIONS 2*	NO 1 1 N/A N/A 2 AND LARGER SH REWED (), SPEC	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL () SEE NO	RATING 150# 150# NPT(F)
FILTER COVER FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-O	N (_), SWING BOLTED-CTER CASE SUPPORTS	*ALL CONNECTIONS *ALL CONNECTIONS 2* ON (), CLAMP-ON (), SCR (YES (X)) (NO ()) MIN	NO 1 1 N/A N/A 2 AND LARGER SH REWED (), SPEC	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL () SEE NO	RATING 150# 150# NPT(F)
FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-O DAVIT (YES 1) (NO X): FIL	N (_), SWING BOLTED-CTER CASE SUPPORTS	*ALL CONNECTIONS *ALL CONNECTIONS 2* ON (), CLAMP-ON (), SCR (YES ()) (NO ()) MIN (YES ()) (NO ())	NO 1 1 N/A N/A 2 AND LARGER SH REWED (), SPEC	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL () SEE NO	RATING 150# 150# NPT(F)
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FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-O DAVIT (YES ()) (NO (X)): FIL SANDBLAST (YES ()) (NO (X)): MFR NO REQ'D	PUCTION 304L SS 304L SS 304L SS 304L SS 304L SS AND AND AND AND AND AND AND AND AND AND	*ALL CONNECTIONS *ALL CONNECTIONS 2* ON (), CLAMPON (), SCE (YES X) (NO) MIN (YES) (NO X) TA BY VENDORS *O.D x'S CU FT:	NO 1 1 1 N/A N/A N/A 2 AND LARGER SH REWED (_), SPEC IMUM HEIGHT TR: MATERIAL _ SURFACE	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL (_), - SEE NO TYPE NO	RATING 150# 150#
FILTER COVER FILTER CASE FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-O DAVIT (YES ()) (NO ()): FIL SANDBLAST (YES ()) (NO ()): MFR () NO REQ'D () NO () NO () NO ELEMENTS EACH FILTER () TOTAL ELEMENT DIRT HOLDING CAPAI CLEAN PRESSURE DROP	RUCTION 304L SS 304L SS 304L SS 304L SS 304L SS N (_), SWING BOLTED-CTER CASE SUPPORTS PAINT PRIMER DAT OPERATING	*ALL CONNECTIONS *ALL CONNECTIONS 2* ON (), CLAMPON (), SCE (YES X) (NO) MIN (YES) (NO X) TA BY VENDORS *O.D x'S CU FT:	NO 1 1 1 N/A N/A N/A 2 AND LARGER SH REWED (_), SPEC IMUM HEIGHT TR: MATERIAL _ SURFACE	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL (_), - SEE NO TYPE NO	RATING 150# 150#
FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-O DAVIT (YES ()) (NO (X)): FIL SANDBLAST (YES ()) (NO (X)): MFR	RUCTION 304L SS 304L SS 304L SS 304L SS 304L SS M (_), SWING BOLTED-CASE SUPPORTS PAINT PRIMER DATE OPERATING ———————————————————————————————————	*ALL CONNECTIONS *ALL CONNECTIONS 2* ON (), CLAMP-ON (), SCR (YES (X)) (NO (X)) IA BY VENDORS *OD () CLAMP-ON () SCR (YES (X)) (NO (X)) IA BY VENDORS COUNTY SCRIPTION STATE ON () CLAMP-ON () SCRIPTION SCRIPTION STATE ON () CLAMP-ON () SCRIPTION S	NO 1 1 N/A N/A 2 AND LARGER SH REWED (), SPECIMUM HEIGHT TR: MATERIAL _ SURFACE	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL (_), - SEE NO TYPE NO	RATING 150# 150#
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FILTER CASE FILTER CASE FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-O DAVIT (YES ()) (NO (X)): FIL SANDBLAST (YES ()) (NO (X)): MFR () NO REQ'D () NO (X): NO ELEMENTS EACH FILTER () TOTAL ELEMENT DIRT HOLDING CAPAI CLEAN PRESSURE DROP () DESCRIBE METHOD OF REMOVING ELI IS DIMENSIONAL OUTLINE INCLUDED NOTES: (1) FILTERS BID SHALL INCLU	RUCTION 304L SS 304L SS 304L SS 304L SS 304L SS N (_), SWING BOLTED- TER CASE SUPPORTS PAINT PRIMER DAT OPERATING : SIZE CITY PSI: SHIPPING EMENTS: (YES) (NO) UDE INITIAL SET OF FILE	*ALL CONNECTIONS *ALL CONNECTIONS 2* ON (), CLAMPON (), SCR (YES ()) (NO ()) MIN (YES ()) (NO (X)) TA BY VENDORS ON () SPARE ON	NO 1 1 N/A N/A 2 AND LARGER SH REWED (), SPECIMUM HEIGHT TR: MATERIAL _ SURFACE	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL (_), - SEE NO TYPE NO	RATING 150# 150#
FILTER CASE FILTER COVER FILTER ELEMENT SUPPORTS FILTER CASE SUPPORTS FILTER CONNECTIONS ELEMENTS GASKETS FILTER COVER TYPE (THRU BOLTED-O DAVIT (YES ()) (NO ()): FIL SANDBLAST (YES ()) (NO ()): MFR NO REQ'D (NO ()): NO ELEMENTS EACH FILTER TOTAL ELEMENT DIRT HOLDING CAPAI CLEAN PRESSURE DROP DESCRIBE METHOD OF REMOVING ELI IS DIMENSIONAL OUTLINE INCLUDED	RUCTION 304L SS 304L SS 304L SS 304L SS 304L SS 304L SS N (), SWING BOLTED-CASE SUPPORTS PAINT PRIMER DAT OPERATING PSI: SHIPPING EMENTS: (YES) (NO) UDE INITIAL SET OF FILT GROUP III ASHRAE 52-7	*ALL CONNECTIONS *ALL CONNECTIONS 2* ON (), CLAMPON (), SCR (YES ()) (NO ()) MIN (YES ()) (NO (X)) TA BY VENDORS ON () SPARE ON	NO 1 1 N/A N/A 2 AND LARGER SH REWED (), SPECIMUM HEIGHT TR: MATERIAL _ SURFACE	SIZE 3° 3° 1/2° ALL BE FLANGED CIAL (_), - SEE NO TYPE NO	RATING 150# 150#

		INCHMENTA									
FLUOR DANIEL	ino. H	BYREVI	SION	SHEET NO.	REV.						
		DATE		P33B_DS-1							
				DATE	CONTRACT						
DATA SHEET				11-28-90	845734						
U.S. Department of Ene	rav 👗			TAG NO.							
U.S. Department of Enel Hanford Waste Vitrificati	on Plant			FL-5	40-012						
Richland, Washington					5896						
DOE Contract DE-AC06	-86HL10838			FOR CLIENT USE							
ROUGHING FILT	FRS 🔼			ORIG BY CHKI	D APPRID						
1.00	ΛF			l i	UM TOTAL						
			<u> </u>	<u> </u>	<u> </u>						
TITLE	KOH/FRIT MODIF	ER FEED TANK ROUGHING FILT	ER								
NO UNITS REQ'D		G 1 SPARE	TYPE (HO	PIZONTAL)	WERTICAL)						
TYPE ELEMENT (THROW - AWAY	A CLEANABLE	VOTUED	1112 (110)	,	(VE:1110/12)						
	_ / (CLEANABLE										
		OCESS DESIGN	4.4.4								
NAME OF FLUID FILTERED		DUST									
QUANTITY FLUID FILTERED	234.3				#/HR						
OPERATING PRESSURE	- 0.1				PSIG						
OPERATING TEMPERATURE					°F						
DENSITY @ OPER TEMP	0.071				LB / FT ³						
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ALLOWABLE PRESSURE DROP_AP	1.0 Clear	. 5.0 Dirty			'H O						
NAME OF PARTICLES REMOVED _	DRY CHI	MICAL DUST FROM FEED TANK	(1,20						
MAXIMUM PARTICLE SIZE					MICRONS						
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SIZE OF PARTICLES TO BE REMOV	ED See Mote	2		· -							
			*** **								
QUANTITY OF PARTICLES TO BE R	EWOAED				#/HR						
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NAME OF FLUID FILTERED AIR	TYPE ELEMENT (THROW - AWAY _X) (CLEANABLE	E) ОТН	(ER	<u> </u>							
NAME OF FLUID FILTERED 300 (S.C.F.M)												
COMMITTY FLUID FILTERED 300 (S.C.F.M.) PSIG		<u> </u>	CESS DESIG	H4		<u></u>						
OPERATING PRESSURE -0.7 PS/G OPERATING TEMPERATURE 77												
OPERATING TEMPERATURE	QUANTITY FLUID FILTERED	300 IS.C.F.I	<u>u</u>									
DENSITY @ OPER TEMP												
VISCOSITY @ OPER TEMP												
ALLOWABLE PRESSURE DROP_AP												
MAXIMUM PARTICLE SIZE								C _P				
MAXIMUM PARTICLE SIZE								•H ₂ O				
MICRONS Size OF PARTICLES TO BE REMOVED See Note 2	NAME OF PARTICLES REMOVED											
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TOTAL ELEMENT DIRT HOLDING CAPACITY CU FT: SURFACE SQ FT CLEAN PRESSURE DROP PSI: SHIPPING WEIGHT DESCRIBE METHOD OF REMOVING ELEMENTS: IS DIMENSIONAL OUTLINE INCLUDED (YES 🔲) (NO 🔘) IS FILTER IN ACCORD WITH SPECS (YES 🔘) (NO 🔘)	DESIGN PRESSURE	SS SS SS SS SS SS SS SS SS SS SS SS SS	FRATURE	OTHER	NO 1 1 2 ARGER SH D (_), SPE HEIGHT	SIZE 6 6 1/2 ALL BE FLANGE CIAL (_), - SEE	ED S NOTES	RATING 150# 150# NPT(F)				
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U.S. Department of Ener Hanford Waste Vitrification	on Plant					SPECIFICATION	FL-580-00)1
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HEPA FILTERS	8	K Y Y-				ORIG BY	CHK.D	APPR'D
						M. Desai	KJ.M.	
TITLE		FSMT	VENT HEPA FIL	LTER				
NO UNITS REQ'D			1 5	PARE 1	TYPE (HO	RIZONTAL	¥) NFR	TICAL
TYPE ELEMENT (THROW - AWAY _2								
			OCESS DESI					<u> </u>
NAME OF FLUID FILTERED	AIR CONTAINING		· 		TER VAPOR &	FORMIC ACI	ñ	
QUANTITY FLUID FILTERED								#/HF
OPERATING PRESSURE								
OPERATING TEMPERATURE								
DENSITY @ OPER TEMP								
VISCOSITY @ OPER TEMP		0.018	· · · · · · · · · · · · · · · · · · ·					C,
ALLOWABLE PRESSURE DROP.AP.								'H₂0
NAME OF PARTICLES REMOVED MAXIMUM PARTICLE SIZE								
MINIMUM PARTICLE SIZE		177						MICRONS
SIZE OF PARTICLES TO BE REMOVE		5 MICRON	S AND I ARGE!	?				MICRONS
QUANTITY OF PARTICLES TO BE RE				·				MICRONS # / HP
GOARTH OF TARRIOLES TO BE TO								# / ロロ
	·		HANICAL DE					
DESIGN PRESSURE7/25				<u>150</u> ∘F		SION ALLOW		
CODES: ASME (YES X) (NO	L) STAMP	(YES 🔼) (NO LL)	OTHER		NUCLEAR G	RADE	
MATERIALS OF CON	STRUCTION		*CONA	ECTIONS	NO	I siz	7F	RATING
FILTER CASE	304L S	S	INLET		1	3		150#
FILTER COVER	304L S	-	OUTLET		1	3		150#
FILTER ELEMENT SUPPORTS	304L S	_	VENT		•	+ -		150#
FILTER CASE SUPPORTS			DRAIN			 		ļ
FILTER CONNECTIONS	304L S		INSTRUMEN	irre				407.5
ELEMENTS	3041.3	<u> </u>	- INSTRUMER	115	2	1/2	<u></u>	NPT(F)
1			4				*******	<u> </u>
GASKETS			4			<u> </u>		
			ALL CONN	ECTIONS 2" AN	D LARGER SH	IALL BE FLAI	NGED	
FILTER COVER TYPE (THRU BOLTED	CON (). SWING	BOITEDO	N (X) CLAMP	ON () SCRE	WED () ODE	CIAL ()	CEE NOT	EO)
DAVIT (YES) (NO X):								
SANDBLAST (YES) (NO X):			(YES D) (NO		M HEIGHT _			
SANDBLAST (TES LL) (NO LL)			A BY VENDO					
MFR		DAI		no .		TOPE N		
	NO OPERATING _		. Al	O SPARE		TYPE N	J	
NO ELEMENTS EACH FILTER								
TOTAL ELEMENT DIRT HOLDING CA				- SIN				
CLEAN PRESSURE DROP								SQ FT
			17 [1011]					
DESCRIBE METHOD OF REMOVING	ELEMENTS:							
DESCRIBE METHOD OF REMOVING							<u></u>	-
IS DIMENSIONAL OUTLINE INCLUDE	D (YES D) (NO 🗆)			SPECS (YES	□) (NO [<u></u>	
·	D (YES D) (NO 🗆)			SPECS (YES	□) (NO Î	<u></u>	
IS DIMENSIONAL OUTLINE INCLUDE	ED (YES) (I	NO D) ET OF FILTE	ERING ELEMEN		SPECS (YES	□) (NO Ì	<u> </u>	
IS DIMENSIONAL OUTLINE INCLUDE NOTES: (1) FILTERS BID SHALL IN	ED (YES) (I	NO D) ET OF FILTE	ERING ELEMEN		SPECS (YES		···	ATION 3

FLUOR DANIEL DATA SHEET		BY	I 8	SHEET NO.	REV.
DATA SHEET	NO.	DATE REVIS	SION	P33B-DS-2	20 0
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U.S. Department of Energy Hanford Waste Vitrification	gy Plant		1	77-	IRU H
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HEPA FILTERS				ORIG BY CHK	D APPRID
	\triangle			M. Desai	LJM
TLE VITA	IFICATION BUILDING HEALT	TH PROTECTION VACUUM SYST	EM HEPA FILTER	}	
O UNITS REQ'D	NO UNITS OPERATING	3 _4	TYPE (HORI	ZONTAL _X_)	(VERTICAL
YPE ELEMENT (THROW - AWAY 🔏	(CLEANABLE) OTHER		····	<u>`</u>
	PR	OCESS DESIGN			
IAME OF FLUID FILTERED	AIR GEE	NOIE 2)			
NUANTITY FLUID FILTERED					
PERATING PRESSURE					
PERATING TEMPERATURE ENSITY @ OPER TEMP					
ISCOSITY @ OPER TEMP	0.018				
LLOWABLE PRESSURE DROP_AP_	1.0 CLEA	V. 5.0 DIRTY			
IAME OF PARTICLES REMOVED	PARTICLE	S CONTAMINATED WITH RADIO	DACTIVE PARTIC	E\$	
MAXIMUM PARTICLE SIZE					MICRO
IINIMUM PARTICLE SIZE				·	MICRON
IZE OF PARTICLES TO BE REMOVE					
QUANTITY OF PARTICLES TO BE RE	MOVED				<u>#/</u>
	MEC	HANICAL DESIGN			
ESIGN PRESSURE 15/FULL VACUU		PERATURE 150 °F		ON ALLOWANC	E
ODES: ASME (YES 🗵) (NO) STAMP (YES)) (NO 🗵) OTHER _	N	UCLEAR GRAD	E
MATERIALS OF CON	STRUCTION	*CONNECTIONS	NO	SIZE	RATING
ILTER CASE	304L SS	INLET	1	6"	150#
ILTER COVER	304L SS	OUTLET	1	6'	150#
LI LI OUYEN		T VENT	 		
ILTER ELEMENT SUPPORTS	304L SS	I APPLAI			
- · ·	304L SS	H DRAIN			
ILTER ELEMENT SUPPORTS ILTER CASE SUPPORTS		DRAIN	2	1/2*	NPT/F
ILTER ELEMENT SUPPORTS ILTER CASE SUPPORTS ILTER CONNECTIONS	304L SS		2	1/2"	NPT(F
ILTER ELEMENT SUPPORTS ILTER CASE SUPPORTS		DRAIN	2	1/2*	NPT(F

SAFETY CLASSIFICATION _3_

NOTES: (1) FILTERS BID SHALL INCLUDE INITIAL SET OF FILTERING ELEMENTS

(2) ROOM AIR SATURATED WITH WATER VAPOR.

105\OS\101\204\84571930.001/WP51/01/25/93 4:38pm

ATTACHMENT B EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

		MAX	IMUM ENVE (inches)	LOPE
TAG NUMBER	MODEL NUMBER*	LENGTH	WIDTH	HEIGHT
FH-450-001A	Flanders, G-1, CC-D	42	23	23
FH-450-001B	Flanders, G-1, CC-D	42	23	23
FH-460-001A	Flanders, G-1, CC-D	42	23	23
FH-460-001B	Flanders, G-1, CC-D	42	23	23
FH-520-001	Flanders, G-1, CC-D	42	23	23
FH-520-002	Flanders, G-1, CC-D	42	23	23
FH-520-003	Flanders, G-1, CC-D	42	23	23
FH-520-006	Flanders, G-1, CC-D	42	23	23
FH-520-007	Flanders, G-1, CC-D	42	23	23
FH-520-008	Flanders, G-1, CC-D	42	23	23
FH-520-009	Flanders, G-1, CC-D	42	23	23
FH-520-010	Flanders, G-1, CC-D	42	23	23
FH-520-011	Flanders, G-1, CC-D	42	23	23
FH-520-012	Flanders, G-1, CC-D	42	23	23
FH-540-001	Flanders, G-1, CC-D	42	23	23
FH-540-002	Flanders, G-1, CC-D	42	23	23
FL-540-003	Flanders, G-1, CC-D	42	23	23
FL-540-004	Flanders, G-1, CC-D	42	23	23
FL-540-005	Flanders, G-1, CC-D	42	23	23
FL-540-006	Flanders, G-1, CC-F	42	23	23
FL-540-007	Flanders, G-1, CC-F	42	23	23
FL-540-009	Flanders, G-1, CC-F	42	23	23
FL-540-010	Flanders, G-1, CC-F	42	23	23
FL-540-011	Flanders, G-1, CC-F	42	23	23
FL -54 0-012	Flanders, G-1, CC-F	42	23	23

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FL-560-001A	Flanders, G-1, GG-D	42	23_	23
FL-560-001B	Flanders, G-1, GG-D	42	23_	23
FL-580-001	Flanders, G-1, GG-D	42	23_	23
FH-620-001A	Flanders, G-1, GG-F	60	41	27
FH-620-001B	Flanders, G-1, GG-F	60	41	27
FH-620-001C	Flanders, G-1, GG-F	60	41	27
FH-620-001D	Flanders, G-1, GG-F	60	41	27
FH-620-001E	Flanders, G-1, GG-F	60	41	27
FH-620-001F	Flanders, G-1, GG-F	60	41	27
FH-620-001G	Flanders, G-1, GG-F	60	41	27
FH-620-001H	Flanders, G-1, GG-F	60	41	27

^{*}Equipment shall be of this model number or equal.

U.S. DEPARTMENT OF ENERGY Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 15898 HEGA FILTERS B-595-P-P33B-15898

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE <u>ターター</u>93 ORIGINATOR:

CHECKER:

J. J. Ichkhan, Mechanical Eng.

 $\overline{\mathsf{n}}$

APPROVED BY:

C. J. Divona

Lead Discipline Engineer

Date

1-26-9

Date

U.S. DEPARTMENT OF ENERGY

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

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SECTION 15898 HEGA FILTERS B-595-P-P33B-15898

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<u>PART</u>																															<u>PAGE</u>
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ATTA	HMI	ENTS																													

ATTACHMENT	111 <u>rc</u>
Α	DATA SHEETS
В	EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

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SECTION 15898 **HEGA FILTERS**

PART 1 GENERAL

SUMMARY 1.1

This specification section describes the requirements for design. fabrication and testing of high efficiency gas absorber (HEGA) filters to be used in an environmental protection application on the vent stream from the organic acid system.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B1.20.1

1983 (Rev. 92) Pipe Threads, General

Purpose (Inch)

ANSI B16.5

1988 Pipe Flanges and Flanged Fittings

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

and/or

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ANSI/ASME N509

1989 Nuclear Power Plant Air Cleaning

Units and Components: Interpretations

No. 1

ANSI/ASME N510

1989 Testing of Nuclear Air Treatment

Systems

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A176

1990 Standard Specification for Stainless

and Heat-Resisting Chromium Steel Plate.

Sheet, and Strip

ASTM D1056

1985 Standard Specification for Flexible Cellular Materials - Sponge or Expanded

Rubber

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-6

1989 Surface Preparation Specification

No. 6, Commercial Blast Cleaning

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RELATED REQUIREMENTS 1.3

Specification Section 01730 Operation and Maintenance Data

Specification Section 05060 Welding Structural

Specification Section 15196 Identification and Tagging Methods for Mechanical Equipment

1.4 **DEFINITIONS**

FAT Factory Acceptance Test

HEGA High Efficiency Gas Absorber

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 **SUBMITTALS**

SE SE

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

- 1.6.1 HEGA filter outline drawings, dimensions and weight.
- 1.6.2 Detail drawings of the HEGA filter and its various components shall be submitted for Buyer approval. These drawings shall include weights, anchor bolt details and materials to be used.
- 1.6.3 Data Sheets

Seller shall submit complete data sheets for the furnished equipment. These data sheets shall reflect the design parameters in Data Sheets P33B-DS-1 and DS-2 (Attachment A).

- 1.6.4 A list of recommended spare parts for one (1) year's routine operation shall be supplied. The spare parts list shall include sufficient data to permit procurement from the original manufacturer or any subsupplier.
- 1.6.5 Operation and maintenance manuals in accordance with Specification Section 01730. Complete installation manuals shall be submitted.
- 1.6.6 Factory Acceptance Tests (FATs) shall be submitted in accordance with ANSI/ASME N510. The FAT report shall be submitted for Buyer approval.

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1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

- PROJECT OR SITE ENVIRONMENTAL CONDITIONS 1.8
- 1.8.1 Climatic and Geographic Site Conditions

Α.	Site Elevation	714	feet	above	sea	level

В. Barometric Pressure 14.3 psia

С. Outside Design Temperature

> 1) Maximum Design Temperature 110°F

> 2) Minimum Design Temperature -20°F

3) Wet Bulb Design Temperature 68°F

1.8.2 Operating Environment

> 60°F to 104°F Α. Normal Temperature

В. Maximum Temperature 104°F

C. Relative Humidity Not controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

The following requirements apply to the HEGA filters furnished in accordance with this specification section.

- 2.1.1 Filter Medium - The material for the HEGA filter medium shall be in accordance with ANSI/ASME N509.
- 2.1.2 HEGA Filter Housing - The materials for the HEGA filter housing shall be in accordance both with ASTM A176 Type 304L and ANSI/ASME N509.
- 2.1.3 Adhesives - Adhesives used to seal the filter pack into the case and glue gaskets to the case shall either be nonflammable or selfextinguishing. Dried film exposed to open flame shall either not burn or not continue to support combustion when the source of ignition is removed.

- 2.1.4 Gaskets and Seals Gasket material shall be oil-resistant and ozone-resistant synthetic rubber, closed cell sponge, Grade RE-43 or TE-43 (high temperature) in accordance with ASTM D1056. The gaskets and seals shall also be resistant to formic acid. This material shall be supplied flat and shall not contain asbestos in any form. The gaskets shall be 1/4 inch thick by 3/4 inch wide. Surfaces shall be split or cut.
- 2.1.5 Clamping Mechanism The HEGA filter clamping mechanism shall include pressure bars with preloaded springs. These springs shall exert a sealing force of not less than 1200 pounds per filter. This force shall be applied as an even, uniform load along not less than 80 percent of the top and bottom of each filter frame.
- 2.2 FABRICATION AND MANUFACTURE

Fabrication and manufacture of the HEGA filter assembly shall be in accordance with ANSI/ASME N509.

- 2.2.1 The HEGA filter housing shall be designed for bag-in/bag-out capability suitable for installation of a single-element HEGA filter. The housing shall allow the operator to change filters without coming into contact with the filter element.
- 2.2.2 Each housing door shall be equipped with a double-ribbed bag-out port designed to accept an 8-mil polyvinyl chloride (PVC) bag. The housing shall be designed to prevent damage to the bag during the changeout operation.
- 2.2.3 Two bags (one for equipment start-up and one spare) shall be provided and shipped with each HEGA filter housing. These bags shall include an integral choke cord and mittens to facilitate changeout.
- 2.2.4 One banding kit shall be supplied with the HEGA filter housing. The kit shall include all tools and straps necessary for a complete bag-out procedure.
- 2.2.5 HEGA filter housing flanges shall be in accordance with ANSI B16.5. Pipe threads shall be in accordance with ANSI B1.20.1.
- 2.2.6 Welding All HEGA filter assembly welding shall be in accordance both with ANSI/ASME N509 and Specification Section 05060.
- 2.2.7 Maximum envelope and model number or equal for the HEGA Filter shall be as shown in Attachment B.
- 2.2.8 The HEGA filter housing shall have provisions to be anchored with a minimum of four equally spaced 1/2 inch diameter bolts. The bolt holes shall be 11/16 inch diameter.

2.3 COATINGS

After completion of all fabrication procedures the external surfaces of each HEGA filter shall be thoroughly cleaned of all foreign material, including rust, in accordance with SSPC SP-6. Manufacturer's standard prime and finish paint or coatings shall be applied. Stainless steel surfaces shall not be painted unless specified otherwise.

2.4 LABELING AND TAGGING

Labeling and tagging shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6. This shall be in addition to the manufacturer's identification plate.

2.5 PACKAGING

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- 2.5.1 Preparation for shipment and packing shall be in accordance with Seller's standards. At minimum, they shall provide protection against corrosion and damage during normal handling, shipping and storage. Minimum preparation shall include the requirements listed below.
- 2.5.2 Machined surfaces and threads shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- 2.5.3 Flanged openings shall be covered with wood or plastic protectors. Protectors shall be installed with not less than four (4) full diameter steel bolts and nuts.
- 2.5.4 Threaded connections and tapped holes shall be capped or plugged. Compatible materials shall be used to prevent thread damage.
- 2.5.5 Bracing, supports and rigging connections shall be provided to prevent damage during shipment, lifting and unloading.
- 2.5.6 Separate or loose parts shall be completely boxed. The box shall then be attached to the main item to be shipped as a unit.

All shipping boxes shall be identified by Seller's order number, equipment number and equipment description.

PART 3 EXECUTION

(Not Used)

END OF SECTION

		AT	TACHM	ENT A				
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HEGA FILTE	RS	 	- 		··	-		Arres
						S. Lee	KJ.M	
TITLE	ORGANIC /	ACID DRAI	IN CATCH	TANK HEGA FILTER]	···· <u>·</u>		
NO UNITS REQ'D	NO UNITS O			SPARE		RIZONTAL _	X	
TYPE ELEMENT (THROW - AWAY .) OTHER	ITTE (HO	NIZONIAL _	· (VEHI	IUAL}
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MANE OF THUS FUTERED	0004490 40			DESIGN			·	
NAME OF FLUID FILTERED	ORGANIC AC 14.43	IU VAPOH	WITH AIH					
OPERATING PRESSURE	- 0.1							#/HR PSIG
OPERATING TEMPERATURE	77 (A)R=1.0)	- 1.0						°F
SPECIFIC GRAVITY @ OPER TEMP VISCOSITY @ OPER TEMP	pen=1.0j	- 1.0						
ALLOWABLE DIRTY PRESSURE DR	OP 0				· · · · ·			C _P PSI
NAME OF PARTICLES REMOVED	FORMIC ACIL	VAPORS						PSI
MAXIMUM FLOW RATE	212 14							16 / HR
PERFORMANCE RATING	12.5 lbs OF G	AS/ 100 H	s OF ME	5U				Ib / HA
QUANTITY GAS TO BE REMOVED	NIL							Ib / HR

		MECH	ANICAL	DESIGN				
DESIGN PRESSURE 2.5/-0.4	PSIG DES			150 °F	000000	1011 111 0111		1/16*
		(YES)				SION ALLOW <i>.</i> UCLEAR GRA		
CODEC. ACINE (TES ELL) (140	EI) STAINF	(169 (1)	(NO	E) OIRER -				
MATERIALS OF CO	NSTRUCTION		*0	ONNECTIONS	NO	SIZ	E.	RATING
FILTER CASE	304L S.S.		INLET	······································	7	3	,	150#
FILTER COVER			OUTLE	Т	1	3		150#
FILTER ELEMENT SUPPORTS	304L S.S.		VENT		0	 		
FILTER CASE SUPPORTS	304L S.S.		DRAIN					
FILTER CONNECTIONS	30 /2 0.0.			IMENTS	<u> </u>			
ELEMENTS	PURCELL		i i i i i i i i i i i i i i i i i i i	MICHIS	1	1/2	<u>-</u>	NPT(F)
GASKETS	PUROFIL II		ł					
GASKETS	FORMIC ACID RES	SISTANT						
			*ALL C	ONNECTIONS 2" AN	ID LARGER SH	ALL BE FLAI	NGED	
FILTER COVER TYPE (THRU BOLTE								
DAVIT (YES) (NO 🗵):	FILTER CASE SUPPO	ORTS (YE	s 🔲)	(NO) MINIME	M HEIGHT _			
SANDBLAST (YES 🗆) (NO 🗆								
. , ,	,	,,,,		, —, 				
-		DATA	BY VE	NDORS				
MFR						TYPE NO		
NO REQ'D:	NO OPERATING		<u> </u>	NO SPARE		11FE NC	<i>'</i>	
NO ELEMENTS EACH FILTER	: SIZE	·o	.D	x*STR	MATERIAL			
TOTAL ELEMENT DIRT HOLDING C	APACITY		CUET	^ 0,,,	SUBEACE			
CLEAN PRESSURE DROP	PSI: S	HIPPING V	WEIGHT		GUNFACE			SQ F1
DESCRIBE METHOD OF REMOVING	ELEMENTS:		·•					
IS DIMENSIONAL OUTLINE INCLUD		$\overline{\Box}$	10 EU 766					
NOTES: (1) FILTERS BID SHALL IN	ICLUDE INITIAL SET	OF FUTER	IS FILIER	IN ACCORD WITH	SPECS (YES	LJ) (NO	<u>u) </u>	
105/OS/101/207/84571873.MIS/WP51-01/		OF FILIER	MAG EFF	MENIS.	· · ·	SAFETY CI	LASSIFICAT	TION 3
	, 1.10pill					I		· .

		AT	TACHME	NT A				
		NO.		REVISION		SHEET NO.		REV
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DATA SHEE	ΞT					1		
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HEGA FILTE	RS					ORIG BY	C'NHX	APPRIO
		Δ	二			J.M. Janzen	S.S.L	
	ORGANIC	ACID VENT	HEGA EU	TERS				
NO UNITS REQ'D 2						X		
•			***					ICAL)
TYPE ELEMENT (THROW - AWAY .	二) (CLEANABLI	E)	OTHER		<u></u>		
		PRO	CESS D	ESIGN	· · · · · · · · · · · · · · · · · · ·			
NAME OF FLUID FILTERED	ORGANIC A	AD VENT -	NITROGEN	I (N2X), FORMIC AC	CID (FAK)			
QUANTITY FLUID FILTERED								#/HR
OPERATING PRESSURE	0.072			<u> </u>	.			PSIG
OPERATING TEMPERATURE SPECIFIC GRAVITY @ OPER TEMP								<u>_</u>
VISCOSITY @ OPER TEMP								
ALLOWABLE DIRTY PRESSURE DR	IOP <u>-0-</u>							- -р
NAME OF GAS REMOVED	FORMIC ACI	D VAPORS						
MAXIMUM FLOW RATE				·				
MINIMUM FLOW RATE PERFORMANCE RATING	ABSORBS 1:	2 lbs OF GA	S/ 100 lbs	OF MEDIA				
QUANTITY OF GAS TO BE REMOV								
		MECH	ANICAL	DESIGN	<u>-</u>			
DESIGN PRESSURE 5/-0.4								7/16
CODES: ASME (YES) (NO	区) STAMP	(YES ∐)	(NO L	OTHER _				
MATERIALS OF CO	NSTRUCTION		*CI	ONNECTIONS	NO	SIZE		RATING
FILTER CASE	304L S.S		INLET		1	3*		150#
1		<u> </u>	∤	-	1	3"		150#
FILTER COVER			OUTLET					150#
FILTER ELEMENT SUPPORTS	304L S.S		VENT		0	<u> </u>		
FILTER CASE SUPPORTS	304L S.S	S	DRAIN		L			
FILTER CONNECTIONS			INSTRU	MENTS	1	1/2*		NPT(F)
ELEMENTS	PUROFIL II / PU	URAKOL	1					
GASKETS	FORMIC ACID RI	ESISTANT	1			 		
			i		L	ـــــــ	<u> </u>	<u> </u>
	2 011 () 0141110 5	OLTED ON		ONNECTIONS 2" AI				
FILTER COVER TYPE (THRU BOLTE						_		
DAVIT (YES) (NO 🗷):	FILTER CASE SUPP	PORTS (YE	:s 🔲)	(NO 🔲) MINIMU	JM HEIGHT _			
SANDBLAST (YES) (NO []); PAINT P	RIMER (Y	ES 🗶)	(NO 🗆)				
,	•	•	,	, , -				
	H-1		-					
		DATA	BY VEN	IDORS				
MFR						TYPE NO.		
NO REQ'D:	NO OPERATING			NO SPARE				
NO ELEMENTS EACH FILTER								
TOTAL ELEMENT DIAT HOLDING C								SO FT
CLEAN PRESSURE DROP			WEIGHT _			····		
DESCRIBE METHOD OF REMOVING	3 ELEMENTS:							
IS DIMENSIONAL OUTLINE INCLUE	DED (YES D) (N	10 🗖)	IS FILTER	IN ACCORD WITH	SPECS (YES	(NO [<u></u>	
NOTES: (1) FILTERS BID SHALL II								3
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ATTACHMENT B EQUIPMENT MAXIMUM ENVELOPE AND MODEL NUMBER OR EQUAL

		MAXIMU	M ENVELOPE (i	nches)
TAG NUMBER	MODEL NUMBER*	LENGTH	WIDTH	HEIGHT
FG-520-001	Charcoal Services Corp. CSC-1H1W-016-1NB-35	31	40	30
FG-540-001A	Charcoal Services Corp. CSC-1H1W-016-1NB-35	31	40	30
FG-540-001B	Charcoal Services Corp. CSC-1H1W-016-1NB-35	31	40	30

^{*} Equipment shall be of this model number or equal.

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SECTION 16150 MOTORS - INDUCTION FOR GENERAL SERVICE B-595-P-P33B-16150

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REVISION 0 ISSUE DATE 2-2-93	WAPA YES NO X QUALITY LEVEL I II X SAFETY CLASS 1 2 3_X 4
ORIGINATOR: Jackson /2/93 J. J. Ichkhan, Mechanical Engineer Date	CHECKER: D. N. Buzzelli, Land Disd. Checker Date
of the formula, recommend the time of time of the time of time of the time of time	
R.B. Encleso~ C. J. Divona Lead Discipline	<u>1-26-93</u> e Engineer Date

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Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

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SECTION 16150 MOTORS - INDUCTION FOR GENERAL SERVICE B-595-P-P33B-16150

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SECTION 16150 MOTORS - INDUCTION FOR GENERAL SERVICE

PART 1 GENERAL

SUMMARY 1.1

This specification section covers the technical requirements for standard polyphase induction motors ranging in size from 1/2 horsepower to 300, for vertical and horizontal drive applications.

1.2 REFERENCES

The publications listed below form a part of this specification section to the extent referenced. The publications are referred to in the text by the basic designation only.

ANTI-FRICTION BEARING MANUFACTURERS ASSOCIATION (AFBMA)

AFBMA 9

1990 Load Ratings and Fatigue Life for

Ball Bearings

AFBMA 11

1990 Load Ratings and Fatigue Life of

Roller Bearings

INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)

IEEE 43

1974 (Rev. 91) Recommended Practice for

Testing Insulation Resistance of Rotating

Machinery

IEEE 112

1984 Standard Test Procedure for Polyphase

Induction Motors and Generators

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA MG1

1987 (Rev. 1 1989) Motors and Generators

NEMA MG2

1983 Safety Standard for Construction and

Guide for Selection, Installation and Use

of Electric Motors

NEMA MG13

1984 Frame Assignments for Alternating Current, Integral-Horsepower Induction

Motors

STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC SP-6

1989 Surface Preparation Specification

No. 6, Commercial Blast Cleaning

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1 2	DELATED	REQUIREMENTS
1.3	KELAIEU	KENOTKEWEUIS

Specification Section 01730 Operation and Maintenance Data

Identification and Tagging Methods Specification Section 15196 for Mechanical Equipment

1.4 **DEFINITIONS**

FAT - Factory Acceptance Test

TEFC - Totally Enclosed Fan Cooled

SYSTEM DESCRIPTION 1.5

(Not Used)

1.6 **SUBMITTALS**

> Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

- 1.6.1 Speed/torque and speed/current curves shall be submitted.
- 1.6.2 Seller shall complete Data Sheet P33B-DS-1 (Attachment A) and submit for furnished equipment. Insulation resistance readings for the electric motors shall be completed by Seller (Attachment B).
- 1.6.3 Motor outline drawings, shaft dimensions and weight.
- Detail drawings of main and/or auxiliary junction boxes shall be 1.6.4 submitted.
- Operation and maintenance manuals in accordance with Specification 1.6.5 Section 01730. Complete installation manuals shall be submitted.
- Factory Acceptance Test (FAT) data in accordance with 1.6.6 Paragraph 2.5 shall be submitted.
- 1.6.7 FATs procedures shall be submitted.
- 1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

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1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

• • • • • • • • • • • • • • • • • • • •														
A.	Site	Elevation	714 feet above sea leve											
В.	Barome	etric Pressure	14.3 psia											
C.	Outsid	de Design Temperature												
	1)	Maximum Design Temperature	110°F											
	2)	Minimum Design Temperature	-20°F											
	3)	Wet Bulb Design Temperature	68°F											
D.	Inside	e Operating Environment												
	1)	Normal Temperature	60°F to 104°F											
	2)	Maximum Temperature	104°F											

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

3)

Relative Humidity

The following requirements apply to all electrical motors furnished in accordance with this specification section. Special electric motor requirements established by the driven equipment specifications and/or Contract Drawings shall take precedence over this specification section.

Not controlled

GENERAL REQUIREMENTS

Electric motors and motor accessories furnished in accordance with this specification section shall be in full conformance to NEMA MG1, NEMA MG2 and NEMA MG13.

A. Motor Rating

Seller shall be fully responsible for specifying electric motor horsepower, speed and torque characteristics for each motor furnished as part of Seller's driven equipment package.

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Electrical Power Supply В.

Motors 1/2 HP to 300 HP furnished in accordance with this specification shall be designed for 480V/3 Phase/60 Hz power supply. Where motors are constant speed they shall be designed for full voltage across the line starting and rated for continuous duty. In applications where the driven equipment calls for variable speed, the electric motor shall be required to be variable-speed squirrel cage induction controlled by available frequency drive. The main power junction box shall be large enough to accommodate oversized incoming power conductors and conductors for externallymounted power factor correction capacitors. Power junction box shall be rotatable by 90° in each direction. Buyer shall provide variable-frequency starters for variable-speed motors.

С. Grounding

Each electric motor shall include provisions for motor frame grounding. The ground shall utilize a hex head bolt tapped into the motor frame from within the main junction box.

D. Space Heaters

- 1) Electric motor space heaters shall not be provided unless otherwise specified.
- 2) When driven equipment specifications and/or Contract Drawings establish the requirement for electric motor space heaters, they shall operate from 120V/1 Ph/60 HZ power supply with a maximum sheath temperature of 392°F. Space heater electrical leads shall be brought out to a separate junction box mounted to the motor on the opposite side from the main junction box.

Elastomers Ε.

For general service electric motors, elastomer seals and gaskets shall be compatible with the motor application and/or operating environment.

2.2 **FABRICATION AND MANUFACTURE**

1.1

2.2.1 Electrical motors furnished in accordance with this specification section shall be in accordance with NEMA MG1, Normal Starting Torque, Low Slip, Electrical Type A, Design B, for motors with cast iron motor frames.

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Service Factor Α.

> Electric motors shall be designed and selected with a service factor of 1.15 for polyphase motors.

- High-efficiency motors shall be used for motors of 5 HP and В. larger.
- Power factor correction capacitors shall be provided for С. motors of 20 HP or larger to improve the power factor at the motor terminals to 95 percent when the motor is at 3/4 load.
- D. Insulation

Insulation systems for motors on general services shall be Class F or better in accordance both with NEMA MG1 and NEMA MG2. Motor leads shall be copper with compression lugs, both sized for 125 percent load current at motor cooling air discharge temperature.

Temperature Rise Ε.

> Temperature rise in accordance with NEMA MG2 shall not be greater than Class F, 330°F rise above a maximum 104°F ambient temperature.

Enclosure F.

Enclosure shall be totally enclosed fan cooled (TEFC).

G. Sea1s

> Motors shall be equipped with suitable shaft seals. The seals shall prevent moisture, dirt, and corrosive agents from entering the motor enclosure and bearings along the shaft. Seals shall be in accordance with Paragraph 2.1.E.

2.2.2 Bearings

- General service induction motors shall be furnished with Α. bearing housings designed for re-lubrication of antifriction bearings, with provisions for flushing out the old lubricant as new lubricant is added. The motor end bells shall be equipped with grease fittings and purge ports for expelled grease.
- Antifriction bearings shall be in accordance both with В. AFBMA 9 and AFBMA 11. Each electric motor nameplate shall show the data required by NEMA MG1 and include both front and rear AFBMA bearing part numbers.

C. Both ball bearings and roller bearings shall be designed and constructed for 100,000 continuous hours, L-10 minimum life in the specified service in accordance both with AFBMA 9 and AFBMA 11. The design shall be based on continuous service.

2.2.3 Balancing and Vibration Criteria

- A. Motors shall be dynamically balanced per manufacturer's standard practice. Welding or soldering to effect balancing is unacceptable. Parent metal shall be removed to improve balance without affecting the structural strength of the rotating element.
- B. Maximum vibration amplitude in velocity (inch/sec. peak) to obtain a smooth rating for the equipment tested should be as follows:

```
3600 rpm Motors = 0.0098 inch/sec (0.05 to 0.10 Mils)
1800 rpm Motors = 0.0098 inch/sec (0.10 to 0.20 Mils)
1200 rpm Motors = 0.0098 inch/sec (0.15 to 0.30 Mils)
900 rpm or Smaller Motors = 0.0098 inch/sec (0.20 to 0.36 Mils)
```

For vibration amplitude measurements, motors shall be operated at rated operating speed and frequency with a one half key installed in the key seat. Motors shall be mounted on isolators during vibration amplitude measurements in accordance with NEMA MG1.

2.3 LABELING

Labeling shall be in accordance with Specification Section 15196, Paragraph 2.2.2, Type 6. This shall be in addition to the manufacturer's identification plate.

2.4 COATINGS

After completion of all fabrication procedures the external surfaces of each electric motor shall be thoroughly cleaned of all foreign material, including rust, in accordance with SSPC SP-6. Manufacturer's standard prime and finish paint or coatings shall be applied. Stainless steel, nickel, brass, copper, monel, aluminum, hastelloy, lead, galvanized steel, plastics, elastomers and glass surfaces shall not be painted unless specified otherwise.

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2.5 TESTING

2.5.1 Factory Acceptance Tests (FATs)

2.5.1.1 Motor Manufacturer Tests

Each electric motor furnished in accordance with this specification section shall be tested by the motor manufacturer prior to shipment. These tests shall include, but shall not be limited to, High-Potential Tests in accordance with NEMA MG1, Part 3 and Routine Tests in accordance with IEEE 112. Seller shall submit certified copies of motor manufacturer's motor test results.

2.5.1.2 Resistance Tests

Seller shall subject all electric motors furnished in accordance with this specification section to insulation resistance tests in accordance with IEEE 43. Insulation resistance measured during these tests shall not be less than 5 megohms. Seller shall submit completed copies of Attachment B for each electric motor furnished. This test shall be done prior to shipping.

2.5.1.3 Performance Test

All required electric motor performance tests shall be conducted in accordance with the applicable driven equipment specification, and the performance testing, referenced in Section 3 of IEEE 112 and NEMA MG1 Part 12.

2.6 **PACKAGING**

Preparation for shipment and packing may conform to the manufacturer's standards. At minimum, the packaging shall provide protection against corrosion and damage from normal handling and storage. Minimum preparation shall include the requirements listed below.

- Machined surfaces, threads, bearings and bearing housings Α. shall be protected during shipment by application of grease or other suitable rust-inhibiting compound.
- В. Threaded connections and tapped holes shall be capped or plugged. Compatible materials shall be used to prevent thread damage.
- The motor shall be fully protected against moisture С. penetration to the electrical compartments and winding.
- Mechanical seals and other sealing devices shall be D. installed for shipment.

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- E. Bracing, supports and rigging connections shall be provided to prevent damage during shipment, lifting and unloading.
- F. Separate or loose parts shall be completely boxed and attached to the main item to be shipped as a unit. All shipping boxes shall be identified by the Seller's order number, equipment number and equipment description.

PART 3 EXECUTION

(Not Used)

END OF SECTION

ATTACHMENT A

NO. DATE REVISION P33B-DS-1													
<u></u>	NO.	DATE		REVISION				0					
FLUOR DANIEL	\triangle					DATE	CONTRACT						
U.S. Department of Energy	\wedge					TAG NO.							
Hanford Waste Vitrification Plant		 				SPECIFICATION	ON SECTION NO.						
Richland, Washington	Δ					<u> </u>	16150						
DOE Contract DE-AC06-86RL10838	\triangle					FOR CLIENT	USE						
MOTORS - INDUCTION FOR GENERAL	\land					ORIG	СНКД	APPR'D					
SERVICE	$\overline{}$					1		, , , , ,					
ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION SHE	ETS: SECTION 1	6150				L							
Motor Tag Number(s)L													
Manufacture/Serial No.	1	1	1	1	1	/	7	1					
Power Rating KW/HP	1	1	- /	1	1	/	1	/					
Service Factor													
Speed Synch./Full Load, RPM	1	,	/	1	7	/	1	/					
Bearing Type		1				1							
BEARING LUBRICATION		1											
/oltage, Phase, Frequency						1							
Full Load Current AMP						†							
Locked Rotor Current 100%V/80%V	1	1	/	1	1	/	1	1					
Acceleration Time (Incl Load) 100%V/80%V	<i>'</i>	'	/	1	1	 	1	1					
Locked Rotor Stall Time (Cold), Seconds	· ·	1		·	<u> </u>	1							
Locked Rotor Stall Time (Hot) 100%V/80%V	1	7	/	1	1	,	,	1					
ocked Rotor Torques (% FL)	 	 		·	· · · · · · · · · · · · · · · · · · ·	 	<u> </u>	 					
Breakdown Torque (% FL)		-	i			1							
efficiency A Full Load													
B. 3/4 Load													
C. 1/2 Load		1											
Power Factor A. Full Load													
B. 3/4 Load			<u> </u>										
C. 1/2 Load		 	 			1		1					
D. Locked Rotor		 				 							
Sound Pressure Level at 1/Meter in DBA		 	 			1		-					
Space Heaters Volts/Phase/Watts	1 1	1 1	1 1	1 1	1 1	1 /	1 1	1 /					
Rotation (Facing End Opposit Drive Shaft)	 	 '	 ' '	' '	, ,	† 		 					
nsulation		 	 		· · · · · · ·	1		 					
Enclosure Type/Motor Mounting (H or V) TEFC	, , , , , , , , , , , , , , , , , , , 	 	, , , , , , , , , , , , , , , , , , , ,	1	7	† ,	1	 					
Tame	· · · · · · · · · · · · · · · · · · ·	 	 	· · · · · · · · · · · · · · · · · · ·	'	† 		- 					
Netweight Kg/LBS	,	1	 	 ,	1	,		1					
g	'	 '	 '	 	' ' '	† 		 					
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ATTACHMENT B

INSULATION RESISTANCE READINGS FOR ROTATING EQUIPMENT

Test Equipment		Re	f	Rev. No								
Calibration Date	e		Ref.	Spec/Section								
	ENVIRON CONDI											
EQUIPMENT NO.	AMBIENT TEMP [°C]	RELATIVE HUMIDITY	INSUL. RESIST. Ø-GRD. [Megohms]	TEST VOLTAGE [Megohms]	VISUAL CHECK							

SELLER'S REPRESENTATIVE ______ DATE _____

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SECTION 16610 ELECTRICAL REQUIREMENTS FOR PACKAGED MECHANICAL EQUIPMENT B-595-P-P33B-16610

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE Q-Q-93	WAPA YES NO X QUALITY LEVEL I II X SAFETY CLASS 1 2 3_X 4
ORIGINATOR:	CHECKER:
Charles Simpson 1-27-93 C. C. Simpson, Electrical Engineer Date	Edgar Khouri, Electrical Engineer Date
APPROVED BY:	
M	1-27-93
K. A. Owrey Lead Discipline E	

U.S. DEPARTMENT OF ENERGY

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SECTION 16610 ELECTRICAL REQUIREMENTS FOR PACKAGED MECHANICAL EQUIPMENT B-595-P-P33B-16610

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SECTION 16610 ELECTRICAL REQUIREMENTS FOR PACKAGED MECHANICAL EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

This specification defines the technical requirements for the design, fabrication, testing and inspection of the electrical equipment, materials and devices that are furnished in support of mechanical equipment.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA 250

1985 Enclosures for Electrical Equipment

(1000 Volts Maximum), Rev. 2-1988

NEMA ICS 4

1983 Terminal Blocks for Industrial Use

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70

1990 National Electrical Code (NEC)

UNDERWRITER'S LABORATORIES (UL)

UL 360

1986 Liquid-Tight Flexible Steel Conduit

UL 514B

1989 Fittings for Conduit and Outlet Boxes

UL 1059

1988 Terminal Blocks

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

1.4 DEFINITIONS

FAT - Factory Acceptance Test

PVC - Polyvinyl Chloride

	1.
7880-7022 H6	1.
	1.
	1.

1.5	SYSTEMS	DESCRIPTION
1.0	2 2 LI' 2	ACACUTI I TAM

- 1.5.1 Power Supply
- 1.5.1.1 The available power distribution systems at the Hanford Plant are 480 Vac, three-phase, 60 Hz, three-wire, and 208Y/120 Vac, three-phase, 60 Hz, four-wire.
- 1.5.1.2 Buyer shall supply 480 volt, three-phase, three-wire with ground service and a motor controller for each 480 volt motor load which is included in this package.
- 1.5.1.3 Buyer shall provide one or more feeders, as required, to furnish power to all non-motor loads. Feeders shall be 120 volt, single-phase.
- 1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract:

- 1.6.1 Dimensional outline drawings, for Buyer's review, showing the location of all major electrical equipment, including junction boxes, and conduit. Location and size of conduit connections shall be shown on Seller's equipment.
- 1.6.2 Elementary diagrams for all circuits shall include line numbers for all ladder logic, in addition all devices with contacts shall reference line number, drawing number, and sheet number where contact appears. The contact shall include the same references back to the device.
- 1.6.3 Connection diagrams for all electrical equipment. Diagrams shall include equipment identification numbers, terminal block location and identification, and wire numbers.
- 1.6.4 Detailed bills of material, for Buyer's review, including the name of the manufacturer and catalog number of all electrical components.
- 1.6.5 Factory Acceptance Tests (FATs) procedures, for Buyer's review, for all tests specified in Paragraph 2.3.
- 1.6.6 Operation and maintenance manual in accordance with Specification Section 01730, Operation and Maintenance Data.
- 1.6.7 Manufacturer's Installation Instructions for Buyer's review.
- 1.6.8 Certified Test Reports, for Buyer's review, per the requirements of Inspection and Testing of this Section.

1.6.9	Recommended spare parts list.			
1.7	CLASSIFICATION OF SYSTEM AND COMPONENTS			
	(Not	Used)		
1.8	PROJECT OR SITE ENVIRONMENTAL CONDITIONS			
1.8.1	Climatic and Geographic Site Conditions			
	A.	Site Elevation	714 feet above sea level	
	₿.	Barometric Pressure	14.3 psia	
	c.	Outside Design Temperature		
		1) Maximum Design Temperature	110°F	
		2) Minimum Design Temperature	-20°F	
1.8.2	Operating Environment			
	Α.	Indoor Temperatures	60°F to 104°F	
	В.	Relative Humidity	Not controlled	
PART 2 PRODUCTS				

2.1 MATERIALS AND EQUIPMENT

- 2.1.1 General
- 2.1.1.1 When applicable, all electrical materials and equipment shall be listed by Underwriter's Laboratories and shall bear the UL label.
- 2.1.1.2 When two or more components of the same specifications are required the components shall be identical, that is, same manufacturer and catalog number.
- 2.1.2 Conduit
- 2.1.2.1 Liquid-tight flexible steel conduit shall be in accordance with UL 360.
- 2.1.2.2 Conduit fittings shall be galvanized steel and in accordance with UL 514B.

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and the second	2.1.4.2
	2.1.4.3
	2.1.5
	2.1.5.1
	2.1.6
	2.1.6.1

- 2.1.3 Cable
- 2.1.3.1 Power and control cables shall be single or multiconductor. stranded copper with 600 volt insulation. Cables shall be UL listed type XHHW or THHN/THWN in accordance with the National Electrical Code, NFPA 70, Article 310.
- Conductors for power circuits shall not be smaller than No. 12 AWG. Conductors for control circuits shall not be smaller than No. 14 AWG.
- Instrumentation cables shall be UL listed, twisted, shielded pairs or triads, No. 16 AWG, stranded copper, with a copper drain wire. 300 volt rated PVC insulation and overall PVC jacket.
- Terminal Blocks
- Terminal blocks shall be in accordance with NEMA ICS 4 and UL 1059.
- Terminal blocks shall be channel mounting type rated 600 volts. with screw type terminals on both sides.
- Terminal blocks shall have at least 20 percent spare terminals but not less than two spare terminals for each terminal strip.
- **Junction Boxes**
- Junction boxes shall be NEMA 4X in accordance with NEMA 250, and shall have hinged doors and mounting panels for terminal blocks.
- Nameplates
- All electrical equipment and enclosures shall be identified with nameplates. Nameplates shall be machine-engraved, phenolic, with black figures on white background and shall be firmly attached with stainless steel self-tapping screws.
- 2.1.7 Grounding
- All non-current carrying metal parts of electrical equipment shall 2.1.7.1 be bonded together and made electrically continuous.
- Furnish ground lugs in all junction boxes to terminate ground 2.1.7.2 wires from Buyer's conduits.
- Furnish two ground pads on the outside frame of the packaged 2.1.7.3 equipment for connection to Buyer's area grounding grid.

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FABRICATION AND MANUFACTURE

- 2.2.1 The electrical installation shall be in accordance with the National Electrical Code, NFPA 70.
- 2.2.2 All wiring shall be continuous from terminal to terminal without splices.
- All instrument, control device and non-motor loads shall be 2.2.3 terminated on terminal blocks in junction boxes.
- Separate conduit systems and boxes shall be used for each of the 2.2.4 following systems:
 - Α. 120 V power and control
 - Milliamp signals and dc circuits В.
- 2.2.5 Wiring between electrical components shall be routed in conduit.
- 2.2.6 No more than two wires, or one wire and one jumper strap, shall be terminated on any one terminal block terminal screw. Where more wires are required, additional terminals shall be used. No uninsulated, exposed conductors shall extend beyond the sides of the terminal block or its insulated barriers. Each terminal block shall have its own identification numbers. Furnish terminals for all ground wires, and for all drain wires in the instrument cables.
- Flexible liquid-tight conduit shall be used to avoid transmission 2.2.7 of vibration from vibrating equipment. Flexible conduit shall also be used to terminate equipment which is periodically removed such as instruments.
- 2.2.8 Conduit connections to junction boxes shall be made using water-tight threaded hubs, or factory threaded hubs.
- 2.2.9 Junction boxes shall be sized in accordance with the requirements of National Electrical Code, NFPA 70, Article 370.
- 2.2.10 Identification
- Wire and Cable 2.2.10.1
- 2.2.10.1.1 Identification of conductors shall be by means of heat shrinkable insulated tubing with conductor identification by heat impressed black on white characters, Thomas and Betts Catalog No. WHT-700 or approved equal.

- Conductors shall be identified at each end. Identification shall 2.2.11 be by individual and distinctive numbers for each conductor, i.e., 1, 2, 3, 4, ...
- 2.3 INSPECTION AND TESTING
- 2.3.1 Factory Inspection
- The equipment shall be inspected at the factory to assure 2.3.1.1 compliance with the specifications, standards and codes and any additional requirements listed in this specification. Submit a report confirming the FATs procedure has been completed.
- Furnish all materials, power supply, motor controllers and test 2.3.1.2 equipment required to perform tests, checks, inspections and the FATs, in accordance with this specification section. Seller has the option of using equipment in his possession with valid National Institute of Standards and Technology Certification of equipment or can use the service of a testing lab with valid National Institute of Standards and Technology Certification.
- The calibrating and testing equipment used for tests, checks, 2.3.1.3 inspections and the FATs shall be calibrated within six months prior to testing. Seller shall provide proof of calibration.
- Equipment failing the standards test shall not be used until 2.3.1.4 repaired and re-standardized. All calibrating and testing equipment shall have valid certified label affixed to the equipment during usage. The label shall be affixed in a prominent location. The Buyer can, at his discretion, require the calibrating and testing equipment to be checked to the standards. Standards shall not be used as calibration and testing devices in the field.
- Inspection shall include, but not necessarily be limited to, the 2.3.1.5 following items:
- Wire and Cable Tests 2.3.2
- 2.3.2.1 Continuity Test
 - Test for continuity, correctness of wiring and verify Α. correct identification on all conductors installed.
 - Test shall be made with an ohmmeter. В.
- Insulation Resistance Test 2.3.2.2
 - All conductors shall be given an insulation resistance test Α. using a megohmmeter.

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- B. Test shall be made with the lugs in place and conductors disconnected at the equipment. Test shall be made between one conductor and ground with the other conductors grounded. Each conductor shall be tested in the same manner.
- C. Test voltages and minimum acceptable insulation resistance shall be as follows:

Insulation Voltage	Test <u>Voltage</u>	Min. Insulation <u>Resistance</u>
300 volt ac	500 Vdc	10 megohms
600 volt ac	1000 Vdc	10 megohms

PART 3 EXECUTION

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(Not Used)

END OF SECTION

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 17703 INSTRUMENT PIPING MATERIALS B-595-P-P33B-17703

APPROVED FOR CONSTRUCTION

REVISION	0	WAPA YES	NO	X
ISSUE DATE	2-2-93	QUALITY LEVEL I SAFETY CLASS 1	1 I 3_X	<u>X</u>

ORIGINATOR:

CHECKER:

Olis/93

D. G. Van Houten, Control Systems Date

B. R. Carlisle, Control Sys. Eng. Date

APPROVED BY:

JB. Bunning Lead Discipline Engineer Date

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SECTION 17703 **INSTRUMENT PIPING MATERIALS** B-595-P-P33B-17703

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SECTION 17703 INSTRUMENT PIPING MATERIALS

PART 1 GENERAL

1.1 SUMMARY

This section includes the technical requirements for the furnishing of instrument piping materials for the Vibrating Filters instrumentation.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI B16.11

1980 Forged Steel Fittings, Socket-Welding and Threaded

AMERICAN PETROLEUM INSTITUTE (API)

API STD 598

1990 Valve Inspection and Testing

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B1.1

1989 Unified Inch Screw Threads (UN and

UNR Thread Form)

ANSI/ASME B1.20.1

1983 Pipe Threads, General Purpose (Inch)

ASME/ANSI B16.10

1986 Face-to-Face and End-to-End

Dimensions of Valves (Revision of

ANSI B16.10 - 1973)

ASME B31.3

1990 Chemical Plant and Petroleum

Refinery Piping, Including Addenda "a"

and "b"

ANSI/ASME B36.10M

1985 Welded and Seamless Wrought Steel

Pipe

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A182/A182M

1990 Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-

Temperature Service

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ASTM A269

1990 Standard Specification for Seamless

and Welded Austenitic Stainless Steel

Tubing for General Service

ASTM A312/A312M

1991 Standard Specification for Seamless

and Welded Austenitic Stainless Steel

Pipes

ASTM A403/A403M

1991 Standard Specification for Wrought

Austenitic Stainless Steel Piping

Fittings

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, INC. (MSS)

MSS SP-25

1978 Standard Marking System for Valves,

Fittings, Flanges and Unions (R 1988)

MSS SP-61

1985 Pressure Testing of Steel Valves

1.3 RELATED REQUIREMENTS

Specification Section 01730

Operation and Maintenance Data

Specification Section 17704

General Instrumentation Installation and Testing

Specification Section 17893

Instruments Furnished with

Mechanical Equipment Frit Slurry

Filters

1.4 **DEFINITIONS**

- National Pipe Thread NPT

PEEK - Poly-Ether-Ether-Ketone

PSIA - Pounds per Square Inch Absolute

Pounds per Square Inch Gauge PSIG -

Polytetrafluoroethylene (Teflon or Equal)

1.5 SYSTEM DESCRIPTION

Material furnished under this specification section conforms to **ASME B31.3.**

1.6 **SUBMITTALS**

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 Catalog information: Including overall dimensions, weight, model number, and connection sizes.

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1.6.2	The Seller shall provide a list of materials to be incorporated in the work. The list of materials shall be supported by sufficient descriptive material to demonstrate conformance to the specifica- tion section requirements.				
1.6.3	Detailed parts list including manufactur	rer's part numbers.			
1.6.4	Certified Material Test Reports for all wetted parts.	pressure containing or			
1.6.5	Factory Acceptance Test Report in accord Section 17893, Paragraph 2.3.	lance with Specification			
1.6.6	Manufacturer's Operation and Maintenance with Specification Section 01730.	Manuals in accordance			
1.7	CLASSIFICATION OF SYSTEMS AND COMPONENTS	5			
	(Not Used)				
1.8	PROJECT OR SITE ENVIRONMENTAL CONDITIONS	5			
1.8.1	Climatic and Geographic Site Conditions				
	A. Site Elevation	714 feet above sea level			
	B. Barometric Pressure	14.3 psia			
	C. Outside Design Temperature				
	1) Maximum Design Temperature	110°F			
	2) Minimum Design Temperature	-20°F			
	3) Wet Bulb Design Temperature	68°F			
1.8.2	Operating Environment				
	A. Normal Temperatures	68°F to 78°F			
	B. Maximum Temperatures	104°F			
	C. Minimum Temperature	60°F			

D.

Relative Humidity

Not Controlled

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PART 2 PRODUCTS

PARI 2	PRODUCT2					
2.1	MATERIALS AND	EQUIPMENT				
2.1.1	General Requi	General Requirements				
2.1.1.1	Instrument pi conform to se	ping material cl rvice designatio	asses and service symbols as listed ons as shown on the Contract Drawings.			
2.1.1.2	All stainless submittal of	steel materials Certified Materi	in this specification require al Test Reports.			
2.1.1.3	Unless otherw are design co		Il pressures and temperatures listed			
2.1.1.4	Pipe threads	shall conform to	ANSI/ASME B1.20.1.			
2.1.1.5	Instrument Pi	ping Material Cl	asses/Services Index			
	Instrument <u>Class</u>	<u>Material</u>	<u>Service</u>			
	ZA	316 Stainless Steel	FSK - Cold Frit Slurry LPW - Process Water PAX - Plant Air CDX - Chemical Drain			
	ZJ	316 Stainless Steel	IAX - Instrument Air (Non Process)			
2.1.2	Instrument Ma	iterial				
2.1.2.1	Instrument Ma	terial Class ZA				
	Material: Temperature L Rating: Maximum Press Construction:	ure:	316 Stainless Steel -20°F to 400°F 3000# Per ANSI B16.11 3/4" and smaller - screwed and/or compression type tube fittings			
	<u>Items</u>	<u>Size</u>	<u>Description</u>			
	Tubing	1/2"	Seamless, 316 stainless steel tubing, ASTM A269, .049" average wall thickness, hardness not to exceed Rockwell B80.			

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Tube Fittings	3/4" and smaller	316 stainless steel, compression type with double ferrules. (Swagelok or equal)
Plug	1/2" and smaller	Square head plug, forged 316 stainless steel, screwed, ASTM A182/A182M, GR F316, ANSI B16.11.
Pipe Nipples	1/2"	Seamless, schedule 80S 316 stainless steel, ASTM A312/A312M, Grade TP316.
Bleed Tee	1/2"	Bleed Tee, 316 stainless steel body. Inlet connection 1/2" male NPT, outlets 1/2" female NPT. (AGCO Model BTS-44 or equal).
Swage Nipples	1-1/2" and smaller	Seamless, schedule 80S 316 stainless steel, ASTM A403/A403M, Grade WP316, concentric, threaded ends.
VALVES		
<u>Items</u>	<u>Size</u>	Description
Needle Valve	1/2"	Needle, 3000#, 316 stainless steel, soft seat, inlet connection 1/2" male NPT, outlet connection 1/2" female NPT.
		Body and Bonnet: 316 stainless steel Stem: 316 stainless steel Seat: PEEK Packing: TFE
Bleed Valve	1/2"	Bleed valve, 316 stainless steel body and bonnet, 316 stainless steel stem, TFE packing, PEEK seat material, inlet connection 1/2" male NPT. (AGCO Model V6VES-4 or equal).
Manifold Valve	1/2"	5-valve manifold, 2 block valves, 1 equalizing valve, 2 calibration valves and 2 test elbows, flanged x screwed, 1/2" female NPT connections. Body and Bonnet: 316 stainless steel Stem: 316 Stainless Steel Seat: PEEK Packing: TFE Accessories: Mount Bracket

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CONSTRUCTION DETAILS

Pipe Bends:

None

Tubing Bends:

Use tubing bends in place of tubing fittings wherever possible. Tubing bends shall be formed with tools designed for the tubing diameter. Minimum 1-1/2" radius bends for 1/2"

tubing.

Thread Compound:

Use an anaerobic thread sealant on

pipe threads.

Note 1: Note 2:

Do not thread tubing. Use compression type fittings. Tubing size is average outside diameter, not nominal

size.

2.1.2.2 Instrument Material Class ZJ

Material:

316 Stainless Steel

Temperature Limit:

150°F

Rating:

3000#

Maximum Pressure:

ANSI B16.11

Construction:

1-1/2" and smaller - screwed and/or

compression type tube fittings

<u>Items</u>	<u>Size</u>	Description
Pipe	1-1/2" and smaller	Seamless, schedule 40S 316 stainless steel, ASTM A312/A312M, Grade TP316.
Tubing	1/4"	Seamless 316 stainless steel tubing, ASTM A269, .035" average wall thickness, hardness not to exceed Rockwell B80.
	1/2"	Seamless 316 stainless steel tubing, ASTM A269, .049" average wall thickness, hardness not to exceed Rockwell B80.
Pipe Fittings	1-1/2" and smaller	90° ell, 3000# forged 316 stainless steel, screwed, ASTM A182/A182M, ANSI B16.11.
	1-1/2" and smaller	Cap, 3000# forged 316 stainless steel, screwed, ASTM A182/A182M, ANSI B16.11.
	1-1/2" and smaller	Tee, 3000# forged 316 stainless steel, screwed, ASTM A182/A182M, ANSI B16.11.

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	1-1/2" and smaller	Union, 3000# forged 316 stainless steel, screwed, ASTM A182/A182M, ANSI B16.11.
	1-1/2" and smaller	Square head plug, forged 316 stainless steel, screwed, ASTM A182/A182M, Grade F316, ANSI B16.11.
Pipe Nipples	1-1/2" and smaller	Seamless, Schedule 80S 316 stainless steel, ASTM A312/A312M, Grade TP316. Threaded ends.
Swage Nipples	1-1/2" and smaller	Seamless, schedule 80S, 316 stainless steel, ASTM A403/A403M, Grade WP 316, concentric. Threaded ends.
<u>Items</u>	<u>Size</u>	Description
Tube Fittings	1/2" and smaller	316 stainless steel, compression type with double ferrules (Swagelok or equal).
VALVES		
<u>Items</u>	<u>Size</u>	<u>Description</u>
Ball Valve	1/4"	Ball valve, 316 stainless steel body and stem, TFE packing, nylon handle with position stops, 1/4" compression type tube connections.
Ball Valve	1/2"	Ball valve, 316 stainless steel body and stem, TFE seat material, 1/2" female NPT connections.

CONSTRUCTION DETAILS

Pipe	Bends:	None
1 IPC	Dellas.	HONC

Tubing Bends:

Use tubing bends in place of tubing fittings wherever possible. Tubing

bends shall be formed with tools designed for the tubing diameter. Minimum tubing bends shall be:

1" radius bends for 1/4" tubing 1-1/2" radius bends for 1/2" tubing

Thread Compound: Use an anaerobic thread sealant on

pipe threads.

Note 1: Do not thread tubing. Use compression type fittings.

Note 2: Tubing sizes are average outside diameter, not nominal size.

2.1.3 Supplemental Requirements

These material requirements are intended to supplement "Description" contained in Paragraph 2.1.2 (Instrument Material), of this specification. In the event of a conflict, the "Description" in the applicable paragraph shall govern.

2.1.3.1 Valves

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- A. Lever operated valves shall be furnished with individual levers, wrenches, or handles.
- B. Tapped holes in valve bodies, where required, shall be threaded in accordance with ASME B1.1, Unified Inch Screw Threads. Threads shall be the Coarse Thread Series with Class 2B tolerances.
- C. Valves shall have face-to-face (or end-to-end) dimensions in accordance with ASME/ANSI B16.10, where applicable.

2.1.3.2 Pipe and Tubing

- A. Pipe and tubing furnished with circumferential buttwelds is not permitted.
- B. Austenitic stainless steel pipe and tubing shall be furnished in the solution annealed condition.
- C. Substitution of schedules, weight or thicknesses, other than those specified shall be submitted to the Buyer for approval prior to fabrication.
- D. Welded seam pipe shall not be substituted for pipe specified as seamless.
- E. Stainless steel tubing shall be supplied in nominal 20 foot straight lengths.
- F. Metallic pipe shall be supplied in random lengths.
- G. Nominal pipe sizes shall be in accordance with ANSI/ASME B36.10M.
- H. Nominal wall thicknesses of steel pipe and fittings shall be in accordance with ANSI/ASME B36.10M.

- I. Pipe specified as Schedule 40 and Schedule 80 shall be in accordance with ANSI/ASME B36.10M.
- J. Unless otherwise specified, metallic pipe finish shall be the manufacturer's standard mill protective type coating, with no deposits in the interior.
- K. Unless otherwise specified, metallic tubing finish shall be the manufacturer's standard mill finish.
- L. Plain end pipe 1-1/2 inches and smaller shall be furnished with ends square cut, no bevel.
- M. Threaded end pipe shall have taper pipe threads in accordance with ANSI/ASME B1.20.1.
- N. Exposed threaded ends of pipe shall be fitted with thread protectors.
- O. Plain tubing ends shall be capped.
- P. Precautions shall be taken to prevent scratching of exterior surfaces of tubing.

2.1.3.3 Fittings

- A. Austenitic stainless steel shall be furnished in the solution annealed condition.
- B. Stainless steel compression fittings shall be produced from material in accordance with ASTM A182/A182M, F316.
- C. Substitution of schedules, weights or thicknesses, other than those specified, shall be submitted to the Buyer for approval prior to fabrication of affected piping.
- D. Mitered type fittings (made by joining sections of pipe) are not permitted.
- E. Pipe and tubing shall be joined by fittings and unions.
- F. Pipe bends shall not be used in place of fittings, except where so specified in Paragraph 2.1.2, or on the Contract Drawings.
- G. When reducing within, to or from screwed construction, use a swage nipple.
- H. Fabricated type tees (made by joining sections of pipe) are not permitted.

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- Tapered reducers (reducers without knuckle radius offsets) are not permitted.
- 2.1.4 Labeling

- 2.1.4.1 Piping components shall be marked and identified by the manufacturer in accordance with the applicable ASTM standards and MSS SP-25.
- 2.2 FABRICATION AND MANUFACTURE

(Not Used)

- 2.3 FACTORY ACCEPTANCE TESTS (FAT)
- 2.3.1 Valves shall be pressure tested in accordance with the following:
 - A. All valves shall be inspected and tested in accordance with the standard to which they are manufactured.
 - B. Valves not covered by a standard shall be tested in accordance with the procedure MSS SP-61, Pressure Testing of Steel Valves, or API STD 598, Valve Inspection and Testing, except that test pressures shall be as follows:

Shell Seat 1.5 x P*

1.0 x P*

 P^* = The nonshock cold water, oil or gas (WOG) pressure rating specified by the manufacturer.

- C. The valve stem packing used during the pressure testing shall be the same that is supplied with the valve.
- 2.3.2 Provide test records including:
 - A. Item tested
 - B. Date of test
 - C. Tester or data recorder
 - D. Type of observation
 - E. Results and acceptability
 - F. Action taken in connection with any deviations noted
 - G. Person evaluating test results
 - H. Test equipment and calibrations
- 2.4 PACKING AND SHIPPING
- 2.4.1 Instrument material shall be packed and protected by the manufacturer's standard packing materials to ensure safe shipment and storage at the jobsite prior to installation.

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3.1	PREPARATION
	(Not Used)
3.2	INSTALLATION, APPLICATION AND ERECTION
3.2.1	Preparation and fabrication of components into assemblies or systems, as well as erection and installation, shall be in accordance with manufacturer's instructions, Specification Section 17704.
3.3	FIELD QUALITY CONTROL
	(Not Used)
3.4	ADJUSTMENTS
	(Not Used)
3.5	CLEANING
	(Not Used)
3.6	PROTECTION
	(Not Used)
3.7	DEMONSTRATION
	(Not Used)
3.8	SCHEDULES
	(Not Used)

END OF SECTION

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SECTION 17704 GENERAL INSTRUMENTATION INSTALLATION AND TESTING B-595-P-P33B-17704

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE $2-2-93$	WAPA YES NO X QUALITY LEVEL I II X SAFETY CLASS 1 2 3 X 4
ORIGINATOR:	CHECKER:
D. Yi, Control Systems Engineer Date	BREASISE 1/25/93 B. R. Carlisle, Control Sys. Eng. Date
APPROVED BY:	
J. B. Bunning Lead Discipline E	ngineer Date

Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838

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SECTION 17704 GENERAL INSTRUMENTATION INSTALLATION AND TESTING B-595-P-P33B-17704

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SECTION 17704 GENERAL INSTRUMENTATION INSTALLATION AND TESTING

PART 1 GENERAL

1.1 SUMMARY

This section defines the general requirements for the installation and testing of instrumentation and directs the Seller to specific Specifications for each instrument.

The Seller's work shall conform to the paragraphs of this standard specification which apply to the Seller's scope of work defined in the Order/Subcontract.

1.2 REFERENCES

(Not Used)

1.3 RELATED REQUIREMENTS

Specification Section 16610 Electrical Requirements for Packaged

Equipment

Specification Section 17703 Instrument Piping Materials

Specification Section 17893 Instruments Furnished with

Mechanical Equipment Frit Slurry

Filters

1.4 DEFINITIONS

DBE - Design Basis Earthquake

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 SUBMITTALS

(Not Used)

1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

1.8	PROJ	PROJECT OR SITE ENVIRONMENTAL CONDITIONS												
1.8.1	Clim	atic and Geographic Site Conditions												
	Α.	Site Elevation	714 feet above sea level											
	В.	Barometric Pressure	14.3 psia											
	c.	Outside Design Temperature												
		1) Maximum Design Temperature	110°F											
		2) Minimum Design Temperature	-20°F											
		3) Wet Bulb Design Temperature	68°F											
1.8.2	0per	ating Environment												
	Α.	Normal Temperature	68°F to 78°F											
	В.	Maximum Temperature	104°F											
	C.	Minimum Temperature	60°F											
	D.	Relative Humidity	Not Controlled											

PART 2 PRODUCTS

941 3202 10879

- 2.1 MATERIALS AND EQUIPMENT
- 2.1.1 Provide instruments in accordance with Specification Section 17893.
- 2.1.2 Provide piping material in accordance with Specification Section 17703.
- 2.2 FABRICATION AND MANUFACTURE

(Not Used)

PART 3 EXECUTION

- 3.1 PREPARATION
- 3.1.1 Inspect instruments to confirm they meet the requirements of the Section that specified them.

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3.2	INSTALLATION, APPLICATION, AND ERECTION
3.2.1	Instrument Mounting
3.2.1.1	Mount instruments in accordance with the manufacturers' instructions.
3.2.1.2	Install instrument stands and column supports plumb and level.
3.2.2	Instrument Piping
3.2.2.1	Install air supply, pneumatic signal, and process sensing piping/tubing in accordance with manufacturers' installation instructions.
3.2.2.2	Locate pipe and tubing to make it inconvenient to use as a step or handhold.
3.2.3	Instrument Wiring
3.2.3.1	Install instrument wiring in accordance with manufacturers' installation instructions and Specification Section 16610.
3.3	FIELD QUALITY CONTROL
	(Not Used)
3.4	ADJUSTMENTS
	(Not Used)
3.5	CLEANING
	(Not Used)
3.6	PROTECTION
	(Not Used)
3.7	DEMONSTRATION
	(Not Used)
3.8	SCHEDULES
	(Not Used)

END OF SECTION

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

SECTION 17892 FRIT SLURRY FILTER LOCAL PANELS B-595-P-P33B-17892

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE $2-2-93$	WAPA YES NO _X QUALITY LEVEL I II _X SAFETY CLASS 1 2 3_X 4
ORIGINATOR:	CHECKER:
D. Yi, Control Systems Engineer Date	Bellarlisle 1/25/93 B. R. Carlisle, Control Sys. Eng. Date
APPROVED BY:	
OB Brunning	01/25/93
6. B. Bunning Lead Discipline E	ngineer Date

FLUOR DANIEL, INC. Advanced Technology Division Fluor Contract 8457

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SECTION 17892 FRIT SLURRY FILTER LOCAL PANELS B-595-P-P33B-17892

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FUNCTIONAL DESCRIPTION

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SECTION 17892 FRIT SLURRY FILTER LOCAL PANELS

PART 1 GENERAL

SUMMARY 1.1

This section defines the requirements for Local Panels LP-580-003 and LP-580-004. The panels will control the operation of Process Frit Slurry Feed Tank (PFSFT) Filter and Decontamination Frit Slurry Feed Tank (DFSFT) Filter, specified in Section 15894.

1.2 REFERENCES

1.2.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

FACTORY MUTUAL (FM)

Directory

1991 Approval Guide

INSTRUMENT SOCIETY OF AMERICA (ISA)

ISA RP60.6

1984 Nameplates, Labels and Tags for Control Centers

ISA S20

1981 Specification Forms for Process Measurement and Control Instruments, Primary Elements and Control Valves

MILITARY STANDARD (MIL-STD)

MIL-STD-1472D

1989 Human Engineering Design Criteria for Military Systems, Equipment and Facilities Change

Notice 1, 1991

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA 250

1985 Enclosures for Electrical Equipment (1000 Volts Maximum)

(Revision 1 - May 1986, Revision 2 - May 1988)

NEMA ICS 3

1983 Industrial Systems,

(Section 304)

(Revision 1 - July 23, 1990)

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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70

1990 National Electrical Code

U.S. NUCLEAR REGULATORY COMMISSION (NUREG)

NUREG-0700

1981 Guidelines for Control Room Design Reviews; September 1981

UNDERWRITERS LABORATORIES INC. (UL)

Directory

1990 Electrical Appliance and Utilization Equipment Directory

Directory

1991 Recognized Component

Directory

UL 83

1983 Thermoplastic-Insulated Wires and Cables Ninth Edition;

February 22, 1989

UL 486A

1991 Wire Connectors and Soldering Lugs for use with Copper Conductors Eighth Edition; October 8, 1991

UL 1059

1988 Terminal Blocks Second Edition; July 16, 1991

1.2.2 Reference Drawings

Drawing No. H-2-123070

P&ID System 58, Process Frit Slurry Pump and Filter

Sheet 4

P&ID System 58, Decon Frit

Drawing No. H-2-123070 Sheet 6

Slurry Pump and Filter

RELATED REQUIREMENTS 1.3

Operation and Maintenance Data

Specification Section 01730 Specification Section 15894

Vibrating Filters

Specification Section 17893

Instruments Furnished with Mechanical Equipment Frit

Slurry Filters

Drawing No. H-2-121653

LP-580-003 and 004 Instrument

Panel Layout

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1.4 **DEFINITIONS**

DCS Distributed Control System DFSFT - Decontamination Frit Slurry Feed Tank FAT - Factory Acceptance Test LCD - Liquid Crystal Display

LP - Local Panel

MTBF - Mean Time Between Failures PCD - Process Control Description PFSFT - Process Frit Slurry Feed Tank PLC - Programmable Logic Controller

PSID - Pounds Per Square Inch, Differential **VDDR** - Vendor Drawing and Data Requirements

SYSTEM DESCRIPTION 1.5

The P&ID H-2-123070, Sheets 4 and 6; Specification Section 15894 and 17893; Attachment A; and Panel Layout Drawing H-2-121653 describe a generic system and its control requirements. The Seller shall design the control configurations, sequence logic. and interlock logic to implement the specific control system required for the safe, efficient operation of the mechanical equipment being furnished, including the interface with the instruments and control systems not in this Order/Subcontract.

1.6 **SUBMITTALS**

Submit the following in accordance with the Vendor Drawing and Data Requirements (VDDR) section of the Order/Subcontract.

Use only the following drawing sizes:

- Α 8-1/2 by 11 inches
- В 11 by 17 inches
- D 28 by 40 inches
- 1.6.1 Catalog cuts describing each instrument and accessory.
- 1.6.2 Manufacturers' installation drawings and instructions.
- 1.6.3 Manufacturers' operation and maintenance manuals in accordance with Section 01730.
- P&IDs showing the Seller's system and its interface to the rest of 1.6.4 the plant. The Buyer will furnish instrument tag numbers on the approval prints for Seller's instruments not shown on P&ID H-2-123070 Sheets 4 and 6 listed in Paragraph 1.3.
- 1.6.5 Process Control Description (PCD) - a narrative describing the system operation, including normal and abnormal conditions, startup and shutdown. Use the following outline:

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ŀ			

- 1.0 GENERAL DESCRIPTION
- 2.0 OPERATING DESCRIPTION
 - 2.1 Routine Operations
 - 2.2 Infrequent Normal Operations
 - 2.3 Abnormal Conditions
- 1.6.6 Instrument data sheets similar to ISA S20, completed in accordance with ISA S20 instructions.
- 1.6.7 General arrangement drawings, front and rear views, including provisions for anchorage.
- 1.6.8 Rear view showing internal layout of instruments and accessories.
- 1.6.9 Electrical elementary diagrams showing devices, power wiring, signal wiring, and terminations.
- 1.6.10 Panel wiring diagram, shown as a not-to-scale expanded rear view with devices and terminal blocks in their correct relative positions, conduit duct layouts, wire routing, and terminations.
- 1.6.11 Instrument list showing tag number, service, manufacturer, model number, range, and setpoint if applicable.
- 1.6.12 Factory Acceptance Tests (FAT) procedure including requirements in Paragraph 2.3.1.
- 1.6.13 Report confirming the FAT procedure was executed and the results.
- 1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

- 1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS
- 1.8.1 Climatic and Geographic Site Conditions
 - A. Site Elevation

714 feet above sea level

B. Barometric Pressure

14.3 psia

- C. Outside Design Temperature
 - 1) Maximum Design Temperature

110°F

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Not controlled

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2)	Minimum	Design	Temperature	-20°F
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3) Wet Bulb Design Temperature 68°F

1.8.2 Operating Environment

Normal Temperature	68° to 78°F
Maximum Temperature	104°F
Minimum Temperature	60°F
	Maximum Temperature

PART 2 PRODUCTS

9415202.08部7

D.

2.1 MATERIALS AND EQUIPMENT

Relative Humidity

- 2.1.1 General Requirements
- 2.1.1.1 The control panels, accessories, materials, and instrumentation shall operate under the conditions of Paragraph 1.8.
- 2.1.1.2 Provide accessories, materials, and methods of fabrication not included in this specification, but which are necessary to complete the fabrication of the control panels.
- 2.1.1.3 When two or more components with the same specifications are required, the components shall be identical (same manufacturer and catalog number).
- 2.1.1.4 Electrical components or devices which operate at voltages higher than 30 volts or energy greater than 100 VA shall be UL Listed, UL Recognized Components, or FM Approved Devices (refer to UL and FM directories).
- 2.1.2 Panel and Accessories
- 2.1.2.1 The basic panels LP-580-003 and LP-580-004 shall be standard, type 304 stainless steel, factory made, ANSI/NEMA 250, Type 4X enclosures, Hoffman or equal. The panels shall have provisions to be mounted to the equipment with four 1/4 inch diameter bolts. Bolt holes shall be 5/16 inch diameter.
- 2.1.3 Instruments
- 2.1.3.1 Provide a stainless steel tag, 18 ga. minimum, with the instrument tag number and Seller's service description stamped or engraved, affixed to each instrument with stainless steel wire (preferred), stainless steel screws, or rivets. If the instrument size or

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> configuration prevents use of a separate tag, propose an alternate method of tagging, such as engraving or stamping, for Buyer's approval.

- 2.1.3.2 Instruments provided by the Seller shall include the features listed by instrument type below:
- 2.1.4 Automatic Backwash Controllers
- Provide Automatic Backwash Controllers (R-PLC™) or equal, to 2.1.4.1 perform control, sequence, and alarm functions based on the control configuration, timing sequence, and inputs from the field instruments.

The Controllers shall incorporate the following criteria:

- Power input 120 Vac 60 Hz Α.
- В. Operating voltage and dip recovery in accordance with NEMA ICS 3-304.40 and 3-304.41
- С. Electrical noise tolerance in accordance with NEMA ICS 3-304.42
- D. Application program stored in EPROM.
- User configuration memory stored up to 5 days during power E. loss.
- F. I/O optically isolated solid-state design unless relay interface is required.
- G. Field experience records or calculations to verify the overall MTBF of the Automatic Backwash Controllers (R-PLC) equals or exceeds 20,000 hours.
- Н. Menu index parameters to perform configuration, enable/disable functions, and timing sequence operation.
- I. LCD (0.25 inches minimum character size with 2 x 16 columns) and alphanumeric keypad for operator interface.
- Automatic backwash capability initiated by differential J. pressure setpoint.
- K. Dry contact outputs for common trouble alarm, power failure alarm, and controller failure alarm.

2.1.5 Electrical Selector Switches

- A. Heavy duty, oil-tight, corrosion resistant, maintained 3-position selector switches.
- B. Contact blocks with screw terminals, rated for the load to be switched.
- 2.1.6 Pushbutton Switch
 - A. Heavy duty, oil-tight, corrosion resistant, full guard, pushbutton switches.
 - B. Contact blocks with screw terminals, rated for the load to be switched.
- 2.1.7 Status Indicators
 - A. Indicators in accordance with Panel Layout Drawing listed in Paragraph 1.3.
 - B. Indicators with at least 50,000 hour life.
- 2.2 FABRICATION AND MANUFACTURE
- 2.2.1 Panel Modifications
- 2.2.1.1 Modify the panels described in Paragraph 2.1.2 as necessary to support the instrumentation and accessories to be mounted in the panels. The panels shall retain their ANSI/NEMA 250, Type 4X ratings after the modifications have been made.
- 2.2.2 Panel Interior Environment
- 2.2.2.1 Prevent operating temperature from exceeding instrument/equipment manufacturers' operating limits.
- 2.2.2.2 Prevent condensation during shipping, storage, and operation.
- 2.2.3 Painting

Painting is not required on these panels.

- 2.2.4 Instrument Mounting
- 2.2.4.1 Mount and support instruments in accordance with manufacturers' installation documents.
- 2.2.4.2 Adjustments shall be readily accessible. Instruments and components shall be replaceable without disturbing wiring or other equipment.

2.2.4.3	Layout front panel instruments in accordance with MIL-STD-1472D and NUREG 0700. Instrument Panel Layout Drawing H-2-121653 complies with these specifications.
2.2.5	Nameplates
2.2.5.1	Make nameplates from 1/16 inch thick laminated plastic stock with white surface and black core, except as noted on Instrument Panel Layout Drawing. Bevel the edges and remove burrs.
2.2.5.2	Engrave with Helvetica Bold Condensed capital letters. If abbreviations can't be avoided, use abbreviations from ISA RP60.6. Other abbreviations are subject to Buyer's approval.
2.2.5.3	Fasten the nameplates to the panel with stainless steel Number 4-40 screws or 1/8 inch drive rivets.
2.2.5.4	Provide 1 inch maximum height nameplates with instrument tag numbers engraved in 1/8 inch high letters on the back the panel to show the location of front and back of panel mounted instruments.
2.2.5.5	Make front of panel nameplates as shown on Instrument Panel Layout Drawing (H-2-121653).
2.2.6	Panel Piping
	Piping is not required on these panels
2.2.7	Panel wiring
2.2.7.1	Wiring material and installation methods shall comply with NFPA 70, Article 725, Class 1 or Class 2.
2.2.7.2	Use No. 16 AWG stranded copper wire with MTW insulation conforming to UL 83.
2.2.7.3	Terminate conductors on screw terminals with tin plated copper, compression ring-tongue, nylon insulated terminals in accordance with UL 486A. Use Thomas and Betts Catalog No. RB-14 (#18-14 AWG) and RC-10 (#12-10 AWG) or equal.
2.2.7.4	Identify wires at both ends with white tubular shrink-on sleeves with permanently imprinted black characters. Use the same number throughout the run of daisy chained wires.
2.2.7.5	Use the instrument tag number and a sequential number for the wire number. Use the same sequential number for the same instrument terminal on similar instruments.
2276	Support wiring in motal or plactic massure or carduit
2.2.7.6	Support wiring in metal or plastic raceway or conduit.

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Provide channel mounted terminal blocks with Number 8 screws, 2.2.7.7 rated 600 volts and in compliance with UL 1059. Use Allen Bradley catalog number 1492-CD3 or equal.

> Provide an even number of spare terminals greater than 25 percent of terminals used.

- Provide a copper safety ground bus bolted to the panel frame with 2.2.7.8 screws to connect 8 or more 10-14 AWG ground wires.
- Divide the main incoming 120 Vac power by system or function. 2.2.7.9 Install a fused disconnect switch on the line (hot) side of each circuit. Color code the wires as follows:

Black Hot - White Neutral - Green Ground

If power from external systems, such as the control voltage from 2.2.7.10 motor starters, comes in to the panel, provide a red nameplate with white letters stating:

> CAUTION 120 VAC CIRCUITS FROM EXTERNAL SOURCES MAY BE ENERGIZED WHEN THE PANEL MAIN BREAKER IS OPEN

- Install a duplex receptacle on a separate 120 Vac circuit to power 2.2.7.11 test equipment.
- Provide two spare fuses of each type used in the panel. Seal them 2.2.7.12 in a clear plastic bag marked "Spares" and tie-wrap them to the panel interior.
- A lamp test pushbutton switch shall be provided to illuminate all 2.2.7.13 panel lights when depressed.
- Programming and Configuration 2.2.8
- Design control circuits to fail safe condition on loss of power. 2.2.8.1
- Design discrete circuits to operate on 120 Vac, to have contacts 2.2.8.2 closed (power) during normal operation, and to have contacts open on abnormal conditions to cause alarms and shutdowns.
- Design control logic for the LP-580-003 and LP-580-004 for the 2.2.8.3 routine, manual, and abnormal conditions described in the Attachment A.

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> 2.2.9 Interface To Other Instrument And Computer Systems

> > These panels are designed as stand-alone systems, system will generate necessary alarm outputs to the DCS.

- 2.3 FACTORY ACCEPTANCE TESTS (FAT)
- Prepare a Factory Acceptance Test (FAT) procedure and submit it 2.3.1 for approval. Include:
 - Inspection tests to demonstrate that the fabrication and Α. assembly of the materials and equipment meet the requirements of the design drawings and specifications.
 - Physical inspection to determine that instruments are new В. and not damaged.
 - С. Inspect installation, location, mounting, and piping.
 - D. Inspection of applicable code compliance.
 - Full functional test of instrument systems to determine Ε. operability.
 - All electrical control circuits shall be tested and verify F. wiring and equipment functionality.
- Inspect and test instrument installations according to the Buyer 2.3.2 approved FAT procedure.
- Submit a report confirming the FAT procedure has been completed 2.3.3 and the results. Include:
 - Α. Item tested
 - Date of test В.
 - С. Tester or data recorder
 - Type of observation D.
 - Ε. Results and acceptability
 - Action taken in connection with any deviations noted F.
 - Person evaluating test results G.
 - Test equipment and calibrations
- PACKAGING AND SHIPPING 2.4
- Reinstall shipping stops which were removed for calibration and 2.4.1 testing.
- Install temporary additional shipping supports for instruments and 2.4.2 equipment to be shipped mounted in the panel. Identify temporary shipping supports by contrasting color, tag or label to simplify location and removal prior to installation of equipment.

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- 2.4.3 Repack loose instruments and equipment, including those removed for shipment, in the manufacturer's original packing material. Accumulate these in a separate crate marked "INSTRUMENTS" and labeled to allow traceability back to main equipment component.
- 2.4.4 Package all shipped materials to eliminate damage from moisture, vibration, shock and heat damage while in transit or interim storage.

PART 3 EXECUTION

(Not Used)

END OF SECTION

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ATTACHMENT A FUNCTIONAL DESCRIPTION

Each Frit Slurry Vibrating Filter system has multiple filter elements. Each filter element contains a vibrator powered by plant air. Backwashing is initiated automatically when the differential pressure across the system reaches 15 PSID. The backwash sequence may also be initiated manually.

The following description applies to both the Process Frit Slurry Filtration System, FL-580-002V, and the Decontamination Frit Slurry Filtration System, FL-580-003V. The information in parenthesis refers to FL-580-003V.

From the DCS (provided by Buyer), the transfer (recirculation) control program, YCP-FSK-024 (YCP-FSK-062), will open the transfer (recirculation) pump air supply valve, YV-PAX-350 (YV-PAX-195), and later will open the filter vibrator air supply valve, YV-PAX-340 (YV-PAX-215).

During transfer (recirculation), solids will accumulate on the filter element surfaces. This will increase the differential pressure across the filter system. When the differential pressure exceeds 15 PSIG, sensed by PDI-FSK-028 (PDI-FSK-059), the filter system controller will initiate a backwash cycle. Each element will be backflushed individually for 10-20 seconds. The filter system will be sized so that the flowrate through the filter system will not be affected by having one element out of service for backflushing.

When the transfer (recirculation) is complete and the piping has been flushed with water, the flush water supply valve will close, causing low flow through the filter system, sensed by FAL-FSK-031 (FAL-FSK-062) which will close YV-PAX-350 (YV-PAX-195) and YV-PAX-340 (YV-PAX-215).

SECTION 17893 INSTRUMENTS FURNISHED WITH MECHANICAL EQUIPMENT FRIT SLURRY FILTERS B-595-P-P33B-17893

APPROVED FOR CONSTRUCTION

REVISION 0 ISSUE DATE $2-2-93$	WAPA YES NO <u>X</u> QUALITY LEVEL I II <u>X</u> SAFETY CLASS 1 2 3_X 4
ORIGINATOR:	CHECKER:
D. Yi, Control Systems Engineer Date	Blesslide 1/25/93 B. R. Carlisle, Control Sys. Eng. Date
APPROVED BY:	
AFTROYED BI.	0.7
D. B. Bunning Lead Discipline	Ol/25/92 Engineer Date

SECTION 17893 INSTRUMENTS FURNISHED WITH MECHANICAL EQUIPMENT FRIT SLURRY FILTERS B-595-P-P33B-17893

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SECTION 17893 INSTRUMENTS FURNISHED WITH MECHANICAL EQUIPMENT FRIT SLURRY FILTERS

PART 1 GENERAL

SUMMARY 1.1

This section defines the requirements for the supply, installation, inspection, and testing of instruments furnished with Vibrating Filters specified in Section 15894. It does not apply to control panels.

1.2 REFERENCES

The publications listed below form a part of this specification to 1.2.1 the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ANSI/ASME B1.20.1

1983 Pipe Threads, General

Purpose (Inch)

(Revision and Redesignation of

ANSI B21.1 - 1968)

ASME/ANSI B16.5

1988 Pipe Flanges and Flanged

Fittings

FLUID CONTROLS INSTITUTE, INC. (FCI)

ANSI/FCI 70-2

1976 American National Standard for Control Valve Seat Leakage (Reaffirmed April 29, 1982)

FACTORY MUTUAL (FM)

Directory

1991 Approval Guide

INSTRUMENT SOCIETY OF AMERICA (ISA)

ISA S20

1981 Specification Forms for Process Measurement and Control Instruments, Primary Elements

and Control Valves

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA 250

1985 Enclosures for Electrical Equipment (1000 Volts Maximum)

(Revision 1 - May 1986, Revision 2 - May 1988)

UNDERWRITERS LABORATORIES INC. (UL)

Directory

1990 Electric Appliance and Utilization Equipment Directory

Directory

1991 Recognized Component

Directory

UL 429

1982 Electrically Operated Valves Third Edition; November,

1988

1.2.2 Reference Drawings

Drawing No. H-2-123070

P&ID - System 58, Process Frit

Sheet 4

Slurry Pump and Filter

Drawing No. H-2-123070

P&ID - System 58, Decon Frit Slurry Pump and Filter

Sheet 6

1.3 RELATED REQUIREMENTS

Specification Section 01730

Operation and Maintenance Data

Specification Section 15894

Vibrating Filters

Specification Section 16610

Electrical Requirements for

Packaged Equipment

Specification Section 17704

General Instrumentation Installation and Testing

Specification Section 17892

Frit Slurry Filter Local Panels

1.4 DEFINITIONS

DPDT - Double Pole Double Throw FAT - Factory Acceptance Test

LP - Local Panel

VDDR - Vendor Drawing and Data Requirements

1.5 SYSTEM DESCRIPTION

The system and Seller's responsibilities for detailed system design are defined in Article 1.5 of Section 17892 Frit Slurry Filter Local Panels and related requirements in Paragraph 1.3.

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements (VDDR), section of the Order/Subcontract.

Use only the following drawing sizes:

- A 8-1/2 by 11 inches
- B 11 by 17 inches
- D 28 by 40 inches
- 1.6.1 Catalog cuts describing each instrument and accessory.
- 1.6.2 Manufacturers' installation drawings and instructions.
- 1.6.3 Manufacturers' operation and maintenance manuals in accordance with Section 01730.
- 1.6.4 Instrument data sheets similar to ISA S20, completed in accordance with ISA S20 instructions.
- 1.6.5 Plan and elevation drawings with dimensioned locations for instrument and control devices, connections to the mechanical equipment, air supply connections, and terminal boxes.
- 1.6.6 Process tubing detail drawings.
- 1.6.7 Pneumatic tubing detail drawings.
- 1.6.8 Terminal box layout drawings showing location and identification of terminals, conduit sizes and entrance locations.
- 1.6.9 Electrical connection diagrams (point to point wiring).
- 1.6.10 Instrument list showing tag number, service, manufacturer, model number, range, and setpoint if applicable.
- 1.6.11 Factory Acceptance Test (FAT) procedure including requirements in Paragraph 2.3.1.
- 1.6.12 Report confirming the FAT procedure was executed and the results.
- 1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

A. Site Elevation 714 feet above sea level

B. Barometric Pressure 14.3 psia

C. Outside Design Temperature

1) Maximum Design Temperature 110°F

2) Minimum Design Temperature -20°F

Wet Bulb Design Temperature 68°F

1.8.2 Operating Environment

A. Normal Temperature 68° to 78°F

B. Maximum Temperature 104°F

C. Minimum Temperature 60°F

D. Relative Humidity Not controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- 2.1.1 General Requirements
- 2.1.1.1 Provide instrumentation required for the application, including correct range, pressure and temperature rating, and materials of construction to operate under the conditions of Paragraph 1.8.
- 2.1.1.2 Provide accessories, materials, and methods of fabrication not included in this specification, but which are necessary to complete the installation of the instrumentation.
- 2.1.1.3 When two or more components of the same specifications are required, provide identical components (same manufacturer and catalog number).
- 2.1.1.4 Electrical and electronic instruments, control devices, and components which operate at voltages higher than 30 volts or energy greater than 100 VA shall be UL Listed Devices, UL Recognized Components, or FM Approved Devices (refer to UL and FM directories).

2.1.1.5	Instrument	electrical	enclosures	shall	be	ANSI/NEMA	250.	Type	4X.
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- 2.1.1.6 Pneumatic power shall be used to supply diaphragm and piston-operated control valves and valve accessories such as valve positioners.
- 2.1.1.7 Pneumatic systems shall operate on a 3 to 15 psig signal.
- 2.1.1.8 Electronic analog signals shall be 4 20 mAdc.
- 2.1.1.9 Discrete signals shall be 120 Vac.
- 2.1.1.10 Instruments range, span, setpoints and controller settings, which are not specified in this Section, shall be selected by the mechanical equipment Seller.
- 2.1.1.11 Design electrical control circuits to fail-safe on loss of power.
- 2.1.1.12 Instrument power supplies shall be powered by 120 Vac, 60 Hz.
- 2.1.1.13 Switches and relay contacts shall be suitable for the switched load.
- 2.1.1.14 Instrument connections:
 - A. Flanged connections shall be in accordance with ASME/ANSI B16.5.
 - B. Threaded connections shall be in accordance with ANSI/ ASME B1.20.1.
- 2.1.2 Instruments
- 2.1.2.1 Instruments provided by Seller shall include the features listed by instrument type below:
- 2.1.2.2 Pressure Gauges
 - A. 4-1/2 inch dial.
 - B. Accuracy within +/-0.5 percent full scale.
 - C. 316 stainless steel pressure element.
 - D. Shatter proof glass.
 - E. Blowout back protection.
 - F. Tube ratings and overpressure at least 1.3 times maximum scale reading.
 - G. Process connections 1/2 inch NPT

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2.1.2.3 Solenoid Valves

- A. Three-way or four-way valves, direct acting, mounted, and piped to the control valves.
- B. Valves ported to produce the valve failure action required in the de-energized state.
- C. Solenoid coils in accordance with UL 429.
- D. 1/4 inch NPT valve port connections.
- E. 1/2 inch NPT electrical connections.

2.1.2.4 Ball Valves

- A. 90° rotation of the ball.
- B. Full open port equal to line size unless otherwise specified.

2.1.2.5 Self-Actuated Pressure Regulators

- A. Self-contained or pilot operated, with adjustable setpoint.
- B. Select regulator capacity based on 10 percent offset or drop factor.
- C. Seat leakage requirements in accordance with ANSI/FCI 70-2, Class IV.

2.1.2.6 Differential Pressure Switches

- A. Snap acting DPDT switches rated for matched load.
- B. Switch set to actuation point prior to installation.
- C. Setpoint adjustment by means of internal screw.
- D. 1/2 inch NPT high and low process connections.
- E. 3/4 inch NPT electrical connections.
- F. Setpoint repeatability within 0.5 percent of full scale.
- G. Setpoint differential (dead band) fixed and not more than 3 percent of the switch setting.
- H. Accuracy within 1 percent of full scale.
- I. Calibration shift less than 0.5 percent at maximum overpressure of the primary element.

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2.2 INDITION AND IMMOTATION	2.2	FABRICATION	AND	MANUFACTUR
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- 2.2.1 **Instrument Mounting**
- 2.2.1.1 Mount and support instruments in accordance with manufacturers' installation documents, contract drawings, and Section 17704.
- 2.2.1.2 Adjustments shall be readily accessible, instruments and components shall be replaceable without disturbing wiring or other equipment.
- 2.2.2 Instrument Piping
- Install the instrument piping components in accordance with 2.2.2.1 manufacturers' installation documents, contract drawings, and Section 17704.
- 2.2.3 Instrument wiring
- Wiring material and installation shall comply with Section 16610. 2.2.3.1
- 2.3 FACTORY ACCEPTANCE TESTS (FAT)
- Prepare a Factory Acceptance Test (FAT) procedure and submit it 2.3.1 for approval. Include:
 - Α. Inspection/tests to demonstrate that the fabrication and assembly of the materials and equipment meet the requirements of the design drawings and specifications.
 - В. Check for applicable code compliance.
 - C. Inspect electrical installations and test electrical circuits for operability.
 - Check and test pneumatic circuits for operability. D.
 - Calibration test for each instrument. E.
 - F. Full functional test of instrument systems to determine operability.
- Inspect and test the instrument installations according to the 2.3.2 Buyer approved FAT procedure.
- Submit a report confirming the FAT procedure has been completed 2.3.3 and the results. Include:
 - Item tested Α.
 - Date of test В.
 - Tester or data recorder С.

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- D. Type of observation
- E. Results and acceptability
- F. Action taken in connection with any deviations noted
- G. Person evaluating test results
- H. Test equipment and calibrations

2.4 PACKAGING AND SHIPPING

- 2.4.1 Reinstall shipping stops which were removed for calibration and testing.
- 2.4.2 Install temporary additional shipping supports for instruments and equipment to be shipped mounted on the mechanical equipment. Identify temporary shipping supports by contrasting color, tag or label to simplify location and removal prior to installation of equipment.
- 2.4.3 Repack loose instruments and equipment, including those removed from the shipment, in the manufacturer's original packing material. Accumulate these in a separate crate marked "INSTRUMENTS" and labeled to allow traceability back to the main equipment component.
- 2.4.4 Package all shipped materials to eliminate damage from moisture, vibration, shock and heat damage while in transit or interim storage.

PART 3 EXECUTION

(Not Used)

END OF SECTION